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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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A German Dyestuffs Offensive

SOME time ago we referred to the rather mysterious presence in London of representatives of the I.G. Farbenindustrie. There were various rumours respecting the objects of their visit, but nothing very definite emerged from the inquiries beyond the fact that German dyestuff directors or officials were actually here on a business mission. The announcements made in the Scottish and Yorkshire market reports in our Dyestuffs Monthly Supplement this week may possibly supply the explanation. The principal statement is that the I.G. Farbenindustrie purpose making arrangements to set up a registered limited company in this country with headquarters in Manchester, which would thus become their chief distributing and sales centre for Great Britain. In addition to this, some of the leading directors have been busy lately in the North of England re-arranging the organisation of their selling agencies. The intention appears to be to concentrate these in comparatively few hands, and as this means the exclusion of traders who have previously handled German products the process of weeding-out is causing a little feeling. Considerable care has been taken to avoid undue publicity, and the information our correspondents give this week is highly interesting.

There is nothing, so far as we are aware, to prevent a foreign concern acquiring at least a nominal domicile in this country, provided certain formalities as to the directorate, capital and so forth are complied with. American and other firms get in in this way, and presumably there is nothing to prevent German interests from following their example. Bayer Products, Ltd., for example, already have a London company. No doubt, the Board of Trade will see that all the regulations are strictly complied with, and equally, no doubt, the German organisers know all about the conditions to be met. The fact that the I.G. Farbenindustrie have a Manchester selling headquarters will not, however, enable them to evade the licensing provisions of the Dyestuffs Act. They will be permitted to import only the colours that the Dyestuffs Licensing Committee permit to come in. Perhaps they are contemplating a time when no such restriction will be imposed, but obviously that must be some distance ahead.

Where the I.G. would gain would be in the greater knowledge of the British industry and the British markets and of the points on which their attack may be most effectively concentrated. They will, however, find the British organisation in a far different state from its pre-war condition. So far no suggestion has been made of any intention to start manufacture in this country. That would require capital, and the German friends who occasionally look us up invariably assure us that Germany has no money. We recall the recent rumour of a large German dyestuff loan, but after some experience of investment in dyestuffs production the public will need unusually attractive terms before they repeat the rush for the recent Potash Loan.

Working Conditions in Centrifugals

OUR recent remarks in connection with the quality, dryness and crystal structure of sulphate of ammonia have led to an inquiry as to whether or not some standard set of conditions could be established so far as the treatment of the material in the centrifugal is concerned. We gather that by standard conditions in a case such as this is meant such factors as speed, duration of spinning, and thickness of the layer of salt, the second of these items having, of course, an important influence upon the daily capacity of the machine. At all events, it would appear difficult to lay down any hard and fast rules for an operation which must most certainly be largely influenced by local conditions, and it would seem that standards can best be made for each individual machine by the ordinary process of trial and error.

It is not easy to theorise on the length of time required to dry any material in a centrifugal machine, particularly when the material is fed as a slurry and contains an appreciable amount of water. In fact,

Mr. E. A. Alliott, whose work in connection with the design and operation of these machines has long since placed him among the few authorities on the subject, remarked at the Chemical Engineering Conference at Hull a couple of years ago that although the time for which a material is spun certainly enters into the question it is not a very important factor after a certain minimum has been passed. This is an extremely interesting point, particularly when considered in conjunction with the contention of two other workers that wide variations in speed may make very little difference to the "efficiency" of the machine in the case of certain crystal products.

Mr. Alliott's investigations in connection with the distribution of the moisture in the various portions of the load might well be worth the attention of those dealing with sulphate of ammonia. It is not possible to refer in detail to the manner in which distribution was found to occur, but briefly the wettest portions are usually those next to the wall of the basket and the driest those on the inner wall of the load. The first question which probably arises in the minds of those who utilise centrifugal driers is as to what influence variations in centrifugal effect have upon final dryness, but those who have studied the question seem to be agreed that these do not enter into the reckoning to nearly the extent one would expect.

A Congress of Chemists

THE annual meeting of the Society of Chemical Industry to be held in London during the week Monday, July 19, to Friday, July 23, promises to be of more than usual interest. The organising committee is arranging, with the co-operation of all the allied chemical societies, to enlarge the scope of the meeting by making the gathering a Congress of Chemists, and it is hoped that many of the Society's provincial and overseas members will be able to visit London for the occasion. Like the British Association, which will be presided over at Oxford by the Prince of Wales, the annual meeting will be under the patronage of the King, and the Duke of York, the King's second son, is to be present at some of the functions. The opening session will be at the Mansion House, by permission of the Lord Mayor, and there Earl Balfour will deliver the third Messel Memorial Lecture. If it is as good as those of his predecessors, Professor Armstrong and the late Lord Leverhulme, everyone will be satisfied.

The remaining sessions will be held at the Hotel Great Central. On Tuesday morning the usual reports will be presented, and the presidential address will be delivered by Mr. W. J. U. Woolcock. Nothing so far has been announced as to the presidency for the coming year. Mr. Woolcock will conclude his second year in July, and his term of office, even if it ceased then, will be marked by a considerable increase in the membership, the development of co-operative relations between the whole family of chemical organisations, and the stimulation of sectional life and activity. On Wednesday the programme will include an address by Sir Josiah Stamp on "The economic aspect of the control of basic chemical industries," and on Thursday the Chemical Engineering Group—which always does this work extremely well—is arranging a series of papers for discussion. Friday will be given up to a trip to Reading, and during the week there will be a luncheon given by the London Section, a garden party at the Royal Botanical Gardens, a reception and dance at the Hotel Great Central, visits to various works, and the annual dinner of the Society.

In addition to all this, there will be an exhibition of British chemical plant open daily in the Central Hall, Westminster. This is being organised by the British Chemical Plant Association with the object of showing the latest phases of chemical engineering equipment and an interesting collection of anti-corrosive constructional materials and linings. The programme is one of the most attractive arranged in recent years, and a good attendance is confidently expected.

A Chemical Grill

DR. DAVID WESSON, chairman of the North Jersey Section of the American Chemical Society, recently joined the long procession of prophets who have predicted that synthetic beefsteak will be realised through the agency of chemistry, and more than a thousand scientists and industrialists were expected to get together and hear all about the new dish at the national symposium (arranged in connection with the spring meeting of the American Chemical Society) just held at Tulsa, Oklahoma. For our readers' benefit it should be pointed out that synthetic beefsteak has in reality no connection with the natural commodity with which we are all more or less familiar. The expression, in fact, is merely a picturesque example of an imaginative mind seeking for a catch-phrase capable of appealing to the million and thereby enlisting their interest as potential consumers.

Let it be explained, therefore, that leading chemists from New York and other American cities have been meeting at Tulsa for the purpose of presenting results of surveys that promise a new era for—as they put it—"cotton in the kitchen." In other words, the cotton crop in America amounts annually to some 16 million bales yielding nearly 8 million tons of cotton seed, and while the crude seed oil is used for salad oil, lard substitutes, and various industrial purposes, the cotton seed meal (which is the residue remaining after the oil has been pressed out) is utilised almost solely as a cattle food. Now, however, it has been discovered that the cotton meal is capable and worthy of greater possibilities, for it possesses a protein content which gives it a biological value almost, if not quite, equivalent to that of beef. It is claimed that, if properly prepared, cotton seed meal could be made into a meat substitute in which the protein would cost no more than 4d. a lb., whereas the price of the protein in beefsteak works out at about thirty times as much.

Unhappily, when consumed by the human being, this *ersatz* beef does not accommodate itself as perfectly as it might to the digestive machinery; but, nothing daunted, Dr. Wesson is firmly convinced that it is within the power of the chemist so to treat the meal as to render it possibly palatable and even appetising for human consumption. With the increased cost of living and high prices of the necessaries of life, there is undoubtedly a wide field for development by the chemist of cheaper sources of edible materials. The margarine industry is a striking example of the re-

lation that chemistry bears to the food question, and if chemistry can give us synthetic butter it is not, perhaps, expecting too much of it to provide us in time with a tender and nutritive steak or chop. But, judging from certain preferences we have observed in chemists themselves at the club table, the prejudice in favour of the natural joint will take some overcoming.

Colour Specification for Gasoline

We learn officially that the colour requirement for United States Government motor gasoline has been deleted from standard specifications by the executive committee of the Federal Specifications Board as the result of a recommendation by the United States Public Health Service that all gasoline containing tetra-ethyl-lead should be given a distinctive colour as a safety precaution. The method described in the United States Government standard specification for lubricants and liquid fuels, published as Technical Paper 323–A of the Bureau of Mines, will be replaced later by a more suitable test. Although formal revision of the specification has not been made, interim authority has been granted to delete this test pending formal revision.

As a result of the investigations of tetra-ethyl-lead gasoline, it was recommended that all such gasoline be coloured distinctively, and that enough dye should be added to lessen the likelihood of the gasoline being used for cleaning purposes. It was also recommended that all mixing of gasoline with the tetra-ethyl-lead fluid be done at refineries or large-scale distributing stations, so as to have the operation conducted under the best conditions. Several States have enacted legislation making the current U.S. Government specification for gasoline official within the State, and incorporating revisions of the Government specification also in the local specification. For this reason it was necessary to reconcile the Surgeon-General's recommendations with the specifications, and since it has been the opinion of many people for some time that the colour requirement could be replaced by a more suitable one, the action of the executive committee of the Federal Specifications Board was taken upon the recommendation of the Technical Committee for Lubricants and Liquid Fuels. The latter committee is composed of technical representatives of the Government departments which are large users of such petroleum products. Mr. N. A. C. Smith, petroleum chemist, Bureau of Mines, is chairman of the committee, and Dr. George K. Burgess, director of the Bureau of Standards, is chairman of the U.S. Government Federal Specifications Board.

Impressions of German Trade

Mr. T. W. Delehanty, assistant chief of the Chemical Division of the United States Department of Commerce, who has recently been spending a vacation in Europe unofficially studying industrial conditions, has been giving to the Philadelphia Club some interesting impressions of his visit. His attention appears to have been largely occupied with Germany, where he has been impressed by the vigorous efforts made since the war to reorganise industry and to accommodate their methods to post-war conditions. He confirms the impression that the methanol process, which at one time threatened the existence of the American wood distillation industry, is not so economical as was at first represented, and in one instance the plant appears to have been temporarily shut down. An interesting general point, which he found common to all the European countries he visited, is the emphasis placed on the development of export trade, to the neglect, as Mr. Delehanty sees it, of home consumption. In the United States, where export is a secondary consideration, though growing in importance, the development of home consumption is first concentrated on to the maximum point, and perhaps they have a lesson for us here in the need for encouraging increased consumption at home, one indispensable condition of which is cheap and plentiful production.

Book Received

The Association of Special Libraries and Information Bureaux. Report of Proceedings of the Second Conference. London: The Association of Special Libraries and Information Bureaux, 38, Bloomsbury Square. Pp. 206. 5s.

The Calendar

Apr. 10	Mining Institute of Scotland: Annual General Meeting. 3 p.m.	Royal Technical College, Glasgow
12	Royal Institution: General Meeting. 5 p.m.	21, Albemarle Street, London, W.1
12–17	Optical Convention	Imperial College of Science and Technology, South Kensington, London
13	Institution of Petroleum Technologists: "The Oil Fields of the Maracaibo Basin." Campbell	John Street, Adelphi, London, W.C.2
13	Royal Photographic Society. 7 p.m.	35, Russell Square, London
14	Chemical Engineering Group. Joint meeting with the Institution of Chemical Engineers: "The Beet Sugar Industry." J. Kwantes. 8 p.m.	Burlington House, Piccadilly, London
15	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London
15	Optical Society: Ordinary Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington, London
16	Society of Dyers and Colourists (Manchester Section): "A New Reaction of certain Diazo-sulphonates derived from *b*-naphthol-*l*-sulphonic acid." F. M. Rowe, E. Levin, A. C. Burns, J. S. H. Davies and W. Tepper. "The Blinding of Insoluble Azo Colours on Viscose." Dr. F. M. Rowe. 7 p.m.	Manchester
16	Royal Society of Arts: "The Work of the Imperial Institute." Lt.-General Sir William T. Furse. 4.30 p.m.	John Street, Adelphi, London
19–24	Exhibition of British Artificial Silk Goods organised by *The Drapers' Organiser* and *Dry Goods Export Journal*. Open 10-7 daily.	Holland Park Hall, Piccadilly, London
20	Society of Chemical Industry (Birmingham and Midland Section): Joint Conference with the Chemical Engineering Group. "Measuring and Weighing Instruments, as applied to the Chemical Industry." Papers by W. A. Benton and others. 7.15 p.m.	University Buildings, Edmund Street, Birmingham
21	Society of Glass Technology: Annual General Meeting. 2.30 p.m.	Sheffield
22	Oil and Colour Chemists' Association: "The Optical Properties of Linseed Oil and the technique of Van Eyck and his followers." A. P. Laurie	8, St. Martin's Place, Trafalgar Square, London, W.C.2

Catalysts and Enzymes: Industrial Applications.—(II)

By J. B. Firth, D.Sc., F.I.C.

Below we give the conclusion of the Jesse Boot Foundation lecture delivered at the University College, Nottingham, on Friday, March 26, by Dr. J. B. Firth. The first instalment appeared last week.

Surface Combustion

DAVY (1817) showed that when a warm platinum wire was introduced into a jar of coal gas and air (rendered non-explosive by an excess of coal gas) the wire immediately became red hot and continued to glow until nearly the whole of the oxygen had disappeared. During the next fifty years many scientists (including such workers as Dalony and Thenard, Döbereiner, Graham, and Faraday) experimented on the power possessed by solid surfaces generally of inducing slow combination of combustible gases with air or oxygen. Faraday was of the opinion that the function of the surface is to condense both the oxygen and the combustible gas, producing in the surface layers a condition comparable with high pressures. In 1887 Thomas Fletcher showed an experiment in which he " dispensed with flame." He heated a ball of iron wire to redness with a flame, then, stopping the flow of gas for an instant, extinguished the flame, and the combustion then continued on the surface of the iron wire without any flame and, further, with an enormous increase in the heat obtained.

The more recent developments of surface combustion are due to Bone, to whom the term " surface combustion " is due. This phenomenon is undoubtedly a particular type of the catalytic influence of surfaces on chemical reactions. Bone came to the following conclusions :—

(*a*) All surfaces have the power of accelerating gaseous combustion in varying degrees, depending upon their chemical character and their physical structure.

(*b*) All incandescent solids have the power of inducing *flameless* incandescent surface combustion.

(*c*) The combustion takes place only in the layers immediately in contact with the incandescent surface, and not equally through the system.

(*d*) The acceleration of surface combustion depends upon an absorption of the combustible gas and probably also of the oxygen by the surface whereby the gases are activated.

(*e*) The surface becomes electrically charged during the process.

(*f*) The differences between the catalytic power of various surfaces at low temperatures gradually diminish with rise of temperature and practically disappear when bright incandescence is reached.

Incandescent surface combustion has been applied to a number of practical purposes such as steam raising, evaporation, melting of metals, sugar boiling and more recently in cooking appliances for use in hotels, etc.

The Radiophragm

One method was to prepare a porous diaphragm of refractory material fitted in a suitable frame, such that a mixture of gas and air could be fed through. The diaphragm was then placed in the vicinity of the object to be heated. The gas alone was first ignited and then the air turned on, which first caused the flame to become non-luminous; then, as the air was increased, the flame gradually retreated to the surface of the diaphragm; finally the flame disappeared and the surface became incandescent. This type of diaphragm or radiophragm was satisfactory so long as it was freely radiating, but if free radiation was by any means so impeded as to allow too great an accumulation of heat in the incandescent surface layer, then the heat caused intensive combustion to take place in the next layer; the result being that the intensive catalytic combustion surface gradually crept back, layer by layer, in the diaphragm until finally pre-ignition took place in the chamber behind the diaphragm. This possibility of back-firing limited considerably the applications of this mthod. However, as the result of persistent effort, Mr. Cox (of the Cox Air Gas Company) has been able to overcome these difficulties, and he is now able by very carefully grading the size of the granules which compose the diaphragm to eliminate all possibility of back-firing.

This new Cox radiophragm has withstood very severe tests. In one test the accumulation of heat in the surface was so great that the surface began to flux, yet no back-firing took place. Further, it is now possible to have two radiophragms operating with their incandescent surfaces opposite each other, and only a short distance apart, without either of them back-firing. Various modifications of the radiophragms are now extensively used for toasting, grilling, biscuit making, confectionery, etc. Appliances have been constructed for lead melting, hardening and tempering of metals, etc. If the radiophragm is in the form of a cylinder, it is used for water heating, steam raising, and in the construction of certain types of tubular boilers. It would appear from the results to date that there are many possible applications of the Cox radiophragm.

Enzymes

Fermentation processes were known as early as 3000 B.C., when the Chinese were acquainted with a process of making a kind of beer from rice. The Egyptians knew how to malt barley and to prepare a beer from it. In the earliest times fermentation was the name given to those processes which were accompanied by effervescence. Later the term was more restricted, applying mainly to alcoholic fermentation and the formation of acetic acid (vinegar). To-day fermentation is known to be the result of the action of specific " enzymes " which are non-vital substances secreted by living organisms —bacteria, yeasts, moulds, plants or animals.

Three theories have been advanced to explain fermentation : (*a*) Chemical theory of Lavoisier, who showed that the alcohol and carbon dioxide produced by fermentation exactly accounted for the sugar; (*b*) biological theory of Pasteur, in which the living organisms were essential; (*c*) the modern biochemical theory in which the fermentation is due to non-vital substances, specific in action and secreted by the organism.

Living cells give rise to complex and various reactions, they bring about both synthetic and analytical reactions. Thus, in the action of yeast on sugar solutions, new cells appear with the consequent formation of protoplasmic substances which from the chemical standpoint are very complex.

When, on the contrary, one subjects albuminous matters to the action of certain ferments, they pass through a series of changes, first into proteoses, then into peptones, into amides, and finally into ammonia, hydrogen sulphide, oxalic and carbonic acids. It has been stated that the action of an enzyme is " specific "; one enzyme cannot do the work of another. Diastase converts the starch of barley into sugar, which in turn is later converted into alcohol by zymase. Zymase cannot convert starch into sugar; diastase cannot ferment sugar into alcohol. No single enzyme has been isolated in the pure condition, but their actions have been well investigated. They act as catalysts, speed up specific reactions without perceptible change in themselves.

The Brewing of Beer

One of the commonest, yet most complicated, examples of enzyme action is the preparation of beer. The process may be briefly outlined as follows: The barley as delivered is soaked or steeped in water for a period ranging from forty-two to seventy-two hours, according to type and quality. It is then taken out of steep and piled up in a long stack until sprouting or " chitting " begins. It is then spread on floors to a depth of about 6 in., and grown for a period of about nine days at about 60° F. During this growth the enzyme diastase develops. The material is then stacked into a pile or " couch " and the heat developed withers off the rootlets. The resulting green malt is then transferred to a kiln and dried, after which the temperature is raised to give the malt. The higher this temperature, the darker the malt; but, on the other hand, high temperatures reduce the diastase content. The finished malt should now contain only 1·5 to 2 per cent. of moisture.

The malt, together with any other raw grain adjuncts, such as rice or flaked maize, is ground in a mill, and the resulting grist is mashed with water at from 150° F. to 160° F. The diastase acts on the starch of the malt and any added cereals, and converts it into maltose and a small quantity of dextrin (incompletely converted starch). After the contents

of the mash tun have " stood on " for about one and a half hours, the " wort," as the extract is called, is drawn off and run into the copper, where it is boiled for one and a half to two hours with hops. Sugar is often added at this stage. The boiling coagulates and precipitates the albuminoids, and also has a disinfecting effect on the wort. The wort is then passed into the " hop-back," where it is drained from hops and precipitated matter. It is then aerated and passed over a refrigerator into the fermenting vessel at 60° F. Yeast is then thrown in, primary fermentation then takes place, during which the temperature rises about nine degrees; the temperature is not allowed to rise higher, but is kept within this range by cold water coils or attemperators. The first " top " is skimmed off, after which the top which forms during the next four or five days is skimmed off, and may be used for subsequent fermentations. After a day or two the beer is " racked " into barrels; a few ounces of hops may be added to give flavour, a little priming sugar to give " condition " by a little secondary fermentation. Isinglass finings are finally added, and the beer should then be " drop bright."

The brewing of good beer is a complex operation, in which science and technical skill play an important part. The quality of the water, the nature of the malt, the quality and character of the yeast, the various adjuncts, all play a part in determining the character and quality of the product. The process of brewing involves the functioning of a number of enzymes. In addition to amylase or diastase, which converts starch into maltose, and zymase, which converts the sugar into alcohol, there are present the lactic ferment and the acetic ferment, which give rise to small quantities of lactic and acetic acids respectively. Again, other ferments produce small quantities of other alcohols, mainly amyl alcohol (fusel oil). The brewer has also to be very careful to exclude wild yeasts, which may give rise to very undesirable products.

Alcohol and Kindred Products

Whisky, brandy, rum and other spirituous liquors contain a much larger amount of alcohol than beer. The alcohol is produced by the fermentation by yeast, but the final product is obtained by distillation whereby the more volatile alcohol passes into the distillate. The differences in flavour, body, colour and other special characteristics depend upon the materials used in the mash and in the method of working, maturing and storing. The raw materials, in addition to barley malt, include unmalted barley, rye, oats, wheat, maize and molasses.

Yeast is used extensively in bread making; here again alcohol and carbon dioxide are among the products. In the process of baking, bread loses 15 to 20 per cent. of its weight and this loss is due to the escape of carbon dioxide, alcohol and water. Elaborate attempts have been made to collect the alcohol which escapes, but so far without much success. Liebig estimated that in Germany alone 12,000,000 gallons of alcohol disappear yearly in this manner. There remains in fresh bread about two parts of alcohol per 1,000. One author estimates that forty 2-lb. loaves contain as much alcohol as a bottle of port wine.

Alcohol is prepared for commercial purposes by the " amylo process," in which the conversion of the starch into sugar is carried out by certain cultures of moulds; moulds have also been discovered which contain the enzymes necessary for the fermentation of sugar as well as for the initial saccharification of the starch, so that a sterile starch can be transformed directly into alcoholic liquor from which pure alcohol can be obtained. The amylo process has not been developed in this country, mainly due to excise regulations, but with the increasing demand for alcohol for power purposes it will no doubt be given attention.

It has long been known that glycerine is one of the products of the ordinary fermentation of sugar. The insufficiency of glycerine during the war led to further investigation. It has been found that the yield of glycerine is materially increased if alkaline substances are added to the fermenting solution. Sodium sulphite was found considerably to increase the yield of glycerine and according to one formula it is claimed that twenty parts of glycerine, twenty-seven parts of alcohol, and three parts of acetaldehyde are obtained from every hundred parts of sugar fermented.

Time does not permit further development of the subject. I have been able to give only one or two of the commoner examples. Both animal and plant life are very largely based on enzyme actions. The digestion of our food is essentially the work of enzymes. The bio-chemist of to-day is endeavouring to isolate these enzymes and use them under controlled conditions, not only in the laboratory but also in industry. There are already a large number of pure chemicals prepared by enzyme action, and their number is increasing year by year. The chemist is gradually wresting from Nature her secrets and adapting them to the needs of industry.

In the first portion of this article, printed in last week's issue, on p. 325, column 1, line 47, " less than $1 \cdot 10^{8}$ " should have read " less than 1×10^{-8}."

Indian Chemical Notes

(From Our Indian Correspondent.)

THE imports of building and engineering materials into India during the calendar year 1925 amounted in value to Rs. 114 lakhs. The imports of asphalt increased from 8,000 tons to 11,700 tons and of the number of firebricks imported from 1·3 million to 1·8 million. But the imports of cement declined from 114,000 tons to 106,000 tons. The British share declined from 98,000 to 91,000 tons, and the German share declined from 6,500 to 3,800 tons, but Japan increased her share a little.

Dye Imports

The imports of dyes obtained from coal tar amounted in value to 11·6 million lb. valued at Rs. 159 lakhs, as against 20 million lb. valued at 284 lakhs. Thus there is a decline during the year of more than 40 per cent. This is largely due to the unprecedented decline in the imports from Germany which amounted to 6·8 million lb. as against 14·8 million lb. in the preceding year. The British share also declined from 1·5 million lb. to 1 million lb. Alizarine compounds declined from 9·2 to 2·4 million lb. and aniline dyes from 11 to 9 million lb.

Imports of Chemicals

The imports of chemicals and chemical preparations amounted in value to Rs. 198 lakhs as against 214 lakhs in the previous year. The imports of sodium carbonate decreased from 842,000 cwt. to 776,000 cwt. and of soda bicarbonate from 119,000 to 92,000 cwt., but the imports of caustic soda increased from 104,000 to 183,000 cwt. Potassium compounds increased from 22,000 to 32,000 cwt. and magnesium compounds from 100,000 to 110,000 cwt., but lead compounds decreased from 10,000 to 7,000 cwt. Bleaching materials increased from 59,000 to 62,000 cwt. The imports of acids declined from 12,700 cwt. to 11,000 cwt. and the imports of sulphur from 275,000 to 246,000 cwt.

Glycerine Manufacture

The experimental glycerine plant in Madras is now able to recover a fairly satisfactory quality of 80 per cent. concentrated crude glycerine as a by-product from the soap lyes. The question of finding a market for this product is receiving close attention from the Government. Even if the quality is approved the production of the plant is on a comparatively small scale which may not interest British and American manufacturers. The demand for the product in India is inconsiderable. The Madras Government pioneer glue factory has now been closed. It did not prove a success, but only demonstrated the difficulties of glue manufacture in India.

Research in Tanning

The Leather Trades Institute, Madras, has undertaken a comparative study of South Indian tanning materials. In the tannery of the Institute, experiments in the manufacture of a fair quality sole leather by re-tanning Dhori hides were carried out, and now a suitable leather has been evolved by a simple method. Encouraging results have also been obtained from an experimental manufacture of chamois leather by a modification of the ordinary process.

Sulphur Black NNG Liquid

WE have received from Hickson and Partners, Ltd., of 79, Mark Lane, London, E.C.3, and Bradford, a copy of shade card No. 4a, illustrative of dyeing with sulphur black NNG liquid, and giving directions as to the use of the dyestuff. This card is the first of a series showing the principal brands of sulphide blacks made by the firm. On completion of the series a container will be issued.

The Utilisation of Waste Chemical Products

An Issue of Growing Importance

The modern utilisation of products earlier regarded as waste material has had a marked effect on the fortunes of many branches of chemical industry. The following is an abstract of a paper on the subject, read by Mr. T. Andrews before the Hull Chemical and Engineering Society, on March 30.

THE scope offered by this title is much too great to admit of any particulars being given of many of the individual methods used in recovering waste products, and it is my intention to attempt a classification of general methods of recovery, giving where possible some short account of the process and plant actually in use. There is always some difficulty in arriving at a definition of such a vague term as waste, and I propose to consider " waste " as matter with the wrong environment. I prefer this definition to the more usual one of " matter in the wrong place," because the sense of position in the latter definition is so obtrusive as to overshadow the more important factor of condition. In considering the utilisation of waste we must first consider how to bring the material required into the right condition for its successful use, and, secondly, how to bring it to a position where it can be economically used.

Absorption of Waste Gases

Perhaps there is no greater loss borne by industry than that due to escaping gases. The recovery of gases from chemical operations has occupied the minds of eminent chemists and engineers for a long period, and we have only to study the elaborate machinery now in use in our large alkali works to see how far the utilisation of a one-time waste product can materially assist in the development of that industry. In the early days of the manufacture of sodium carbonate by the Leblanc process the hydrochloric acid formed was allowed to escape into the air as waste. The resultant nuisance was so great that Parliament passed the Alkali Act, which, among other things, made the absorption of this gas compulsory. Later on the value of the hydrochloric acid saved the Leblanc process, for the process could not have survived the introduction of the ammonia soda process had it not been for the value of the " waste product."

The apparatus necessary for the recovery of the hydrochloric acid is simple, consisting chiefly of towers filled with some such material as broken brick. Water flows down the towers and absorbs the ascending gas. In some cases more elaborate machinery is necessary. In practically every case, however, the gas is absorbed in a suitable medium. This absorption may be purely physical as in the case given, or the gas may enter into combination. It is not essential that the absorber should be a liquid. In the case of the purification of hydrogen obtained from water gas, solid sodium hydroxide is used to absorb carbon monoxide, yielding sodium formate.

The recovery of gases from solution is the converse of the first case, and occurs, for example, in the recovery of ammonia from the ammoniacal liquors obtained in the distillation of coal. The liquor is treated with milk of lime and steam. Generally speaking, a gas is recovered from a liquid simply by boiling it off in a suitable manner. Although the process is apparently one of great simplicity the plant is often intricate and costly.

Liquids in Solution

In some operations the liquid waste products are solutions of one or more valuable liquids in another liquid, such as water, having little or no value. The lye obtained from soap boiling contains glycerine dissolved in water, with varying proportions of common salt, sodium hydrate and organic impurities. After initial treatment an aqueous solution is obtained containing glycerine together with common salt. This solution is evaporated in vacuo, when the greater proportion of the water is driven off, leaving the less volatile glycerine and salt in the evaporator. The salt is separated and the crude glycerine purified by distillation in steam in the highest possible vacuum, and at a temperature of about 160° C., and further concentrated by evaporation in vacuum evaporators. The residues remaining in the still, consisting largely of polyglycerols, organic acids and some mineral salts, are worked up again for shoe blacking.

A case different from the above is the recovery of a liquid from another liquid where the two are not miscible. Theoretically, the liquids should not mix, and there should be no difficulty in separating them. We all know that oil and water do not mix. In practice we find that oil and water with a trace of some other matter will form emulsions which only separate with the greatest of difficulty. In the case of the vegetable oils and other glycerides, the lime in ordinary water, especially if there is a little free fatty acid present in the oil, is sufficient to prevent anything like true separation. In these cases there are alternative methods of treatment available. We may precipitate the one liquid from the other, we may remove the matter causing the emulsification, or we may rely simply on physical methods for the separation.

The Breaking of Emulsions

The basis underlying the methods where separation by physical means is adopted is a break in the velocity of the two liquids in compartments where it is easy for the two liquids to separate according to their densities. In the majority of cases the two liquids, flowing with a relatively high velocity, are caused to flow into a series of compartments where the velocity is greatly lowered and where the liquids are forced to travel alternately over and under baffles which are submerged in the liquid. Provided there is sufficient space in the compartments between the baffles and that the outlets for the liquids are large enough the liquids will practically come to rest. The two liquids will ultimately separate, the one with the lesser density being found on those compartments whose outlet is below the level of the liquids.

As an example of the removal of the matter causing the emulsification I would refer to the sludges obtained when the acid (sulphuric) is neutralised after the splitting of oils by the Twitchell process. Splitting by the Twitchell process is carried out in an acid solution, the acid employed being sulphuric. After the fats have been split to fatty acids, and the water containing the glycerine has been removed there is a considerable amount of sulphuric acid remaining in the oil. This acid has to be removed, and the general treatment to remove it is by boiling or blowing with barium carbonate sludge together with a little water. The carbonate is converted partly to the sulphate, and there remains in the tanks a mixture of barium sulphate, barium carbonate, water, and some fatty acid that has become entangled in the mixture. An excess of sulphuric acid, often put in in the form of the cheap salt-cake, will cause the carbonate to be entirely converted to the sulphate, and this, being a heavy precipitate, sinks to the bottom of the treatment vessel, leaving the fatty acids on top, with a layer of clear water in between.

A liquid saturating, or partially saturating, a gas is difficult to recover. A good method, having infinite possibilities, is the absorption of the liquid by another liquid. This method is the one adopted in the recovery of acetone removed from cordite paste in the explosives industry. The air from the drying sheds, laden with acetone, is removed by means of an exhauster fan and is made to pass through a series of towers through which flows a solution of sodium bisulphite, which as it falls comes into intimate contact with the ascending acetone laden air. The acetone forms an additive compound with the sodium bisulphite and passes into solution. The acetone is distilled off the solution, rectified, and used again.

Solids and Liquids

A solid in solution in a liquid is one of the commonest recoveries, and plays perhaps the greatest part of all in waste recovery. The chief method of recovering the solid matters in solution depends on concentration by removing the bulk of the liquid followed by crystallisation, and in those cases where the liquid is easily boiled off concentration for the removal of all the liquid. The isolation and recovery of a solid impregnated with a liquid usually involves removal of the bulk of the liquid by filtration and the drying of the residue. But each separate material must be treated on its merits. In some cases the liquid may be removed by centrifuging. The converse of this case—that is, the recover of a liquid

from a solid or mixture of solids—arises in the case of the recovery of oil from fuller's earth used in its filtration. This oil can be partly recovered by steam-distilling the fuller's earth in the filter presses, but can only be completely removed by extraction with solvents. Much work remains to be done in this field, as the fuller's earth remaining after extraction is useless.

An interesting case of recovery of a valuable "waste" product is presented in the case of the cyanide process for recovering gold from gold-bearing earths. Before the development of this method, large amounts of these earths were "dumped" as useless by the gold diggers. In fact, in all the cases above mentioned, the products were, at one time, thrown away as waste. Only chemical wastes have been considered, but there are many other forms. The average dust-bin, for example, contains many heat-units, and the organic fertiliser industry relies for its raw material on those naturally occurring wastes containing nitrogen, phosphorus, or potash.

"The Chemical Engineering Library"

(From a Correspondent.)

During the last few months many evidences have reached me of the popularity of the books issued under the "Chemical Engineering Library" (Second Series). These volumes, which cover a variety of subjects, have been written by experts on aspects of chemical engineering which they have made peculiarly their own. Only the other day, during a visit to Spain, one found that the books on *Crushing and Grinding Machinery* and *Screening and Grading of Materials* occupied a prominent place in the library of an important chemical manufacturing company.

Distillation Principles and *Distillation in Practice* are books of outstanding value, the former clearly outlining the essential principles that underlie the design of such apparatus, and the latter dealing in a practical way with several types of distillation plant as used in the various industries to-day. Wide as the foregoing subjects are, it will be found that the whole gamut of theory and practice are covered by the two volumes in question, and that they suffer little from the terseness which is incidental to a necessary compression.

The increasing demand for practical information concerning high pressure reactions and the plant in which such reactions are effected is met by the admirable little book entitled *Autoclaves and High Pressure Work*. This volume is unique in some ways, and is essentially practical from beginning to end. Its pages not only are bound to be consulted by research chemists who are anxious to undertake investigations relating to reactions at high pressures, but it is a veritable *vade mecum* to the chemical engineer who has frequently to design and erect large-scale apparatus of this kind.

Limitations of space render it impossible to deal with each of the volumes of the "Chemical Engineering Library" separately. It must not be imagined that any absence of reference to a particular book singles it out as one of less importance or usefulness than those of which mention is made. Each of the volumes deals with a special phase of chemical engineering, and undoubtedly serves a specific purpose.

In a recent issue reference was made to the volume, *Design and Arrangement of Chemical Plant*. Here is a book which analyses the psychology of design and reveals how imagination, the exercise of forethought, and a correct appreciation of the various stages of a chemical process, coupled with a realisation of what is demanded in the matter of handling the various raw materials and semi and finished products, are indispensable to the evolution of the best and most efficient type of plant. This book is well written, and its perusal and study can be commended to all who are keenly interested in chemical engineering.

It is only necessary to add one or two final words concerning the volumes of this series. Permission has, we understand, already been sought to translate the two volumes, *Sulphuric Acid Concentration*: (*a*) *By Hot Gases*; and (*b*) *In Heated Vessels*, into Russian. Professor Sladkoff, of the Mendeleev Institut, and an assistant professor of the Moscow University, wrote to one of the authors of the books in question expressing the view that these volumes " . . . are of such great value, and give such indispensable material, that they could be of the greatest use to the Russian chemical industry."

This is not the only testimony that has been received from the Continent, relating to the utility of the volumes of the "Chemical Engineering Library." The general manager of a large chemical works in Belgium, writing the other day, said :—

"Je vous dirai tout d'abord que j'ai parcouru avec le plus vif intérêt votre ouvrage sur les chambres à réaction, qui est remarquablement bien fait et abonde en données précieuses. Je n'avais pas attendu votre lettre pour me rendre compte de l'intérêt que présentent les publications de la 'Chemical Engineering Library,' et dès samedi dernier j'en ai fait commander deux."

Many other evidences of the keen interest that the volumes in question are provoking could be adduced, but these, I think, sufficiently indicate what experts think of these practical little volumes.

French Government and By-Products

To the Editor of The Chemical Age.

Monsieur l'Editeur,—J'ai été fort surpris de trouver dans votre revue, de si bonne tenue, en général, au point de vue pro-allié, une attaque contre l'impérialisme ou militarisme du gouvernement français et cela au sujet du débenzolage du gaz des usines à gaz. Le débenzolage se justifie amplement par le prix de l'essence de pétrole et le désir de diminuer les importations de ce produit pour améliorer le change. Votre article fait simplement preuve de l'état des esprits en Angleterre où une campagne systématique est organisée contre les tendances d'indépendance de la France vis-à-vis de la pression étrangère et disons-le vis-à-vis des intérêts anglo-saxons engagés en Allemagne. Que la presse politique fasse le jeu pour lequel elle est payée, soit, mais que la presse technique emboîte le pas, ce n'est plus du "fair play."

En Belgique, ou la défense militaire est étroitement liée à celle de la France, on est très sensible à cette attitude des alliés anglais. Nous sommes très partisans de l'entente cordiale à trois et nous déplorons que les placements financiers anglais en Allemagne soient un obstacle à cette entente et même qu'ils soient préjudiciables à la masse du peuple anglais et au profit seulement d'une minorité anglaise, plus internationale qu' anglaise. Est-ce trop demander aux Anglais instruits de ne pas appuyer les attaques contre la France, attaques de financiers internationaux, semeurs de légendes.—Yours, etc.,

J. A. Beulemans.

[We are glad to publish this interesting communication as illustrating the French point of view, which we had no desire to ignore in our comments.—Ed. *C.A.*]

Property Repairs *v.* Property Tax

To the Editor of The Chemical Age.

Sir,—The ownership of property, which in these days is becoming a sheer necessity in many cases, carries with it the duty of keeping the property in good repair. An allowance is made under the Income Tax Acts in this respect of an amount varying from one-quarter to one-sixth of the annual value of the property. This allowance, however, seldom covers the actual cost of the repairs done, and provision is therefore made in the Acts for a further allowance up to the full annual value of the property. The procedure to be adopted is similar to that in other cases of claiming for the refund of tax from the Revenue. A special claim to repayment must be made supported by the production of vouchers for the expenditure over the past five years or since ownership commenced.—Yours, etc.,

67/68, Cheapside, London, E.C.2. W. R. Fairbrother.

Otis King's Patent Calculator

Otis King's Patent Calculator, supplied in a variety of models by Carbic, Limited, Holborn Viaduct, London, E.C.1, afford a simple means of solving rapidly and accurately almost any kind of calculation dealt with by professional and business men. Multiplication, division, proportion, percentages, logarithms, powers and roots of numbers, etc., are all obtained by a series of simple mechanical operations which are explained in a leaflet issued. The calculator consists of two metal tubes, the smaller rotating within the larger, both having spiral scales. A third tube mounted on the larger tube forms the tubular indicator.

Germany's Chemical Revival

A Personal Impression of Current Conditions

MR. T. W. DELEHANTY, assistant chief of the Chemical Division, U.S. Department of Commerce, has recently returned from an unofficial European tour, and gave his impressions to the Philadelphia Club, as reported by *Drug and Chemical Markets*.

There is, he said, a marked tendency towards enlisting science to reduce imports through synthesis, and to utilise indigenous raw materials, or substitutes. Thus the fuel problem is of current moment, and peat, water power, as well as a more scientific utilisation of waste materials and coal, are major features of research. Aside from these cost reduction factors are the gains they hope to derive from mergers, trade pacts, and reciprocity conventions, such as the cheapening of transportation, specialisation, mass productions, and reduction of selling costs. In no country is this as pronounced as in Germany.

Here we find the chemical industry the most enterprising and successful of all industries. This is in marked contrast to the industry in other European countries. Although their post-war rehabilitation was as great as that of any other German industry, it is typical of the chemical industry, which has revolutionised other industries, that it should as readily transform itself. Further recognising that chemistry is basic to all industry, it contemplates commercialising the possibilities presented by the rehabilitation of the other industries. We can visualise the development better if we confine our attention to the former I.G., narrowly referred to as the German Dye Industry. Here we find that what was the backbone of the war period may now become the transforming medium of the readjustment period. Their interest centres in domestic raw materials, in possibilities to reduce imports, the utilisation of waste, and the synthesis of substitutes. A few import items which have been at least partially solved to date include fuel, sulphur, and nitrogen products, solvents, various alcohols and their derivatives. In connection with the above, the utilisation of indigenous brown coal and gypsum, as well as the waste gases of processes and by-product furnace, are outstanding. Corollary to the foregoing is the effort to liberate the domestic supply of edible agricultural products from industrial consumption, and to foster increased production.

To science the Germans delegate the task of reducing the cost of the raw material, utilising the readily available by-products of other industries on the one hand, and of making the by-products of their own processes more valuable than the major product, on the basis that everything has an economic use or can be converted into one. Further, that processes should be so specialised and allocated as to embody a well rounded programme, yielding maximum production consistent with maximum monetary returns.

Eliminating Competition by Mergers

Administrative research, moreover, is relied upon to pave the way to unrestricted outlets by elimination of competition, stabilisation, market allocations, the education of the consumer, and further to reduce investment and operating overhead and consummate mergers with the thought of centralised financing, buying, selling and acquiring of allied interests. In brief, to bridge the gap from the raw material to the maximum consumption of the product at a minimum expense and a maximum of profit. This ambitious progress results in a merger so large that specialisation is possible to such a degree that only the ultimate consumable articles are produced and marketed. While this policy tends towards the elimination of the open marketing of intermediate products, yet adherence is contemplated only to the degree wherein it assures a maximum outlet. At times the sale of an intermediate, as an essential raw material of another industry, presents, through such dependence, a control with which we were familiar in our dye industry prior to the war. Recognised professional chemists and engineers, as well as lawyers, bankers and business specialists, are directing these concerns. In fact, this is general in Germany, and no doubt is based on the fact that inasmuch as chemistry has entered into every industry so extensively, that it is now recognised that without chemistry, and hence participation of chemical direction, efficient modern manufacturing is impossible.

German Plants Inspected

I inspected two splendid examples of raw material independence and scientific production: through the courtesy of the officials of the I.G. Teerfarben Industrie A.G. (the name of the new German coal-tar industry merger), the Badische plant at Ludwigshafen-Oppau and the Stickstoff Syndicate plant at Merseberg (Leunawerke). The auxiliary plant at the Oppau works, fully as large as that at Ludwigshafen, located three miles away and connected by their own railroad and pipelines, is the current interest. It is based upon utilisation of the waste and by-products of the mother plant. For example, at this plant hydrogen and nitrogen are combined to form anhydrous ammonia; or which in turn is oxidised to nitric acid, or combined with chlorine, waste sulphuric, nitric or hydrochloric acids to form fertilisers, to be used alone as such or in combination; or spent nitric acid and alkalis to form the sodium, potassium or calcium nitrates; or ammonium and carbon dioxide to form urea, in all a total capacity of 1,000 tons of fixed nitrogen products per day. The synthetic methanol process of combining hydrogen and carbon monoxide was evolved at this plant and similar projects are in process of development. Here, too, was evolved the process in vogue at Merseberg of using ammonia, gypsum, and carbon dioxide instead of sulphuric acid and ammonia for producing neutral ammonium sulphate.

The Badische research laboratory is the central clearing point for plant scale processes in the industrial chemical and by-product utilisation field. This laboratory decides to which plant a process is to be allocated or passes upon the desirability of establishing a new plant for specialised production. This was the step in the establishment of the Merseberg plant, unique in Germany.

It is located near Hall-Salle on the site of the brown coal fields of central Germany; it produces but two products: neutral ammonium sulphate and methanol with a capacity of 2,500 and 25 tons a day respectively, and has but one by-product, calcium carbonate, for which it has cultivated an outlet. At present it obtains gypsum and coke outside the area, but this will soon be eliminated. The methanol process is at present shut down, it is stated, pending a market for a production surplus, and in the interim to inaugurate auxiliary processes.

I was the guest of Meister, Lucius and Brüning at Hoechst-am-Main, another factor of the Cartel, and saw there an entirely different type of production, similar in most respects to the Badische plant, even as to waste utilisation, yet differing to a degree as to the end products. In addition to the major products familiar to you, one will find the manufacture of medicinals, serums and vaccines. Likewise this is the place where artificial wool was developed.

Industry Operating at 50 per cent. Capacity

The chemical industry is the most successful in Germany, and business in 1925 was better than in 1924, still it is operating at about 50 per cent. capacity, and the huge plant of Griesheim in the vicinity of Frankfort is shut down. It is, however, operating more efficiently, employing but two-thirds of the labour requisite in the preceding year. It is in a state of flux, however, and consequently in a receptive condition for the reorganisation contemplated by the merger. Still the reorganisation will inevitably be slow because of lack of capital and difficulty in competing under the strain of stabilisation. However, through fear they are not receptive to foreign capital, but merely desire a loan. With reference to their expansive programme, such new installations as might be feasible have yet to be proven practicable on a plant basis, and in fact scientists in Germany say it is doubtful if even their synthetic methanol process is as economical as presented. The cost has been estimated by some to be at least twice the widely published price, in spite of an inflation built plant and a process based on waste raw material utilisation. They claim that the cost of anhydrous ammonia is a fairly good basis of comparison.

The inland freight or railroad rates are very high, and as much a source of worry as the money tightness and excessive taxation. Firms located on the Rhine, able to export their merchandise in a large way, are considered fortunate, for it is claimed that it costs less to ship to New York than it does to Berlin.

There is naturally great interest in export, and major among such interests are the efforts directed towards opening

up healthy relations with Russia. The extending of inland waterway systems is likewise being stressed. A project under discussion is the Rhine-Main-Danube Canal, designed to strengthen trade relations with south-eastern Europe, with water power as an additional incentive.

At present Germany's imports are 50 per cent. greater than exports. It is interesting to note that chemicals exported amounted to a total of 226 million dollars, which was practically three times greater than their chemical imports. A 60 per cent. increase in exports was recorded over the preceding year, of which fertiliser, principally nitrogen, was increased 100 per cent., coal-tar products 60 per cent., and industrial chemicals and paints, 30 and 50 per cent. respectively.

All Europe Seeks Export Markets

Throughout industry in general there is an abnormal interest in export as an outlet. This is not confined to Germany alone; it is prevalent throughout Europe. No one thinks to any great degree of developing domestic consumption—each country considering itself either the ordained producer or provider of the other fellow's requirements.

With the exception of the chemical industry, Germany seems to be in the throes of an industrial reconstruction, if we may be guided by a foreign trade balance, wherein her total imports are 50 per cent. greater than her exports, large production surplus and unemployment increasing. The chemical industries are no longer the formidable competitors of the past, though in many instances they are undoubtedly sacrificing their merchandise and causing the industry of the rest of the world at least temporary concern. However, even when stability ensues, Germany will in all probability no longer be a competitor of America, for she is lacking in raw materials and her labour costs will inevitably ascend. At present her total imports from the United States are more than twice as great as her exports. Even in the chemical field, though enjoying an experience of over sixty years, she may be placed in a secondary position.

Aluminium Chloride in Dyeing

A Cheaper Synthesis of Anthraquinone

MR. MAX PHILLIPS, of the Colour Laboratory, Bureau of Chemistry, Washington, discusses in *Chemical and Metallurgical Engineering* the effect of cheaper aluminium chloride and phthalic anhydride in making possible a cheaper synthesis of anthraquinone.

Until a few years ago, he states, the only commercially important process for making anthraquinone was that of direct oxidation of anthracene. This situation, however, has been entirely changed by two factors: (1) the development of a cheap process for making aluminium chloride by direct chlorination of bauxite or metallic aluminium scrap so that this commodity is now available in quantities for about 15 cents per pound. (2) The development of the Gibbs-Conover process for phthalic anhydride by the Colour Laboratory of the Bureau of Chemistry, with the result that pure phthalic anhydride may now be purchased for about 20 cents per pound. With the advent of cheap aluminium chloride and cheap phthalic anhydride, anthraquinone is now largely made synthetically from phthalic anhydride, benzene and aluminium chloride.

The reaction is that of Fridel and Crafts, who showed many years ago that phthalic anhydride condenses with benzene in the presence of aluminium chloride giving benzoyl-benzoic acid. This compound undergoes condensation when heated with sulphuric acid giving anthraquinone. The exact function of the $AlCl_3$ in this synthesis is not known with certainty. It is known, however, that it does not act catalytically. For every mole of phthalic anhydride one mole of aluminium chloride must be used, as otherwise low yields are obtained. It seems to have been established quite definitely that the phthalic anhydride, aluminum chloride, and benzene form an intermediate compound consisting of equimolecular quantities of these three components. This compound is hydrolysed when water or dilute acid is added to the reaction mixture and benzoyl-benzoic acid is obtained.

Until recently this synthesis of anthraquinone was only of theoretical interest as the aluminium chloride and phthalic anhydride were too expensive to be used in a commercial process for anthraquinone and could not compete with the process of making anthraquinone by direct oxidation of anthracene.

For the preparation of dyes, particularly vat dyes, synthetic anthraquinone is far superior to the anthraquinone obtained from anthracene because of its high state of purity.

What has been said about anthraquinone applies also to many anthraquinone derivatives such as 2-methyl anthraquinone made from toluene, phthalic anhydride and $AlCl_3$, 2-amino anthraquinone from monochlorobenzene, phthalic anhydride, $AlCl_3$, and ammonia, and many other important dye intermediates and organic chemicals.

The importance of anthraquinone in the synthetic dye industry is apparent when it is recalled that it is the starting material for the preparation of such important dyes as alizarine, Indanthrene blue, yellow and brown, Anthraflavone G, Cibanone orange R, Indanthrene gold orange G, Indanthrene green B, Indanthrene violet R, and many others.

Welding Repairs on Boilers

By S. W. Miller

Although boiler insurance is general in this country, the following contribution from Dr. Miller, past president of the American Welding Society, indicates that it is less common in the United States, and urges certain precautions in repair work.

FOLLOWING the recent boiler explosion on the ss. *Mackanac* in Long Island Sound, New York, the theory was at first advanced that this explosion was caused by failure of a welded patch on one of the boilers. This was later disproved, but, because of the loss of life, the story was very widely published, and, in consequence, the subject of welding on boilers was brought forcibly to the attention of engineers and laymen generally.

In view of the ever-widening applications of fusion welding throughout industry, and the probability that repairs to boilers made in this way will be proposed from time to time, it is well that those responsible for the results should bear several points in mind. For simplicity, these may be listed briefly as follows: (1) While most boilers are insured, many policies are so worded that if repairs are made without the authority of the company carrying the insurance, the policy becomes void. (2) There are Federal, State, and Municipal regulations governing this work, as well as those issued by the insurance companies. (3) Only competent welders, used to boiler work, should be allowed to do the welding. The following precautions should therefore be observed by the owner or his representative: (1) Examine the part of the boiler to be welded in company with the insurance company inspector, and get his approval before doing any welding. (2) Be present at the test after welding with the inspector, and, if possible, get him to sign a statement that the work has been properly done, and that it has passed the test successfully. (3) If the boiler is not insured, and comes under Federal, State, or Municipal supervision, carry out the above programme in company with the proper authority.

If the boiler is neither insured nor under supervision of some constituted authority, ample precautions should be taken by the welder and the owner to protect themselves against possible future trouble. They should make a sketch of the location and size of the repair, with a clear statement of what was found wrong and how the repair was made. They should always make a hydrostatic hammer test of the finished job, using a pressure of 1½ times the working boiler pressure, in the presence of witnesses, and get their signature to a statement of the facts. These papers should be carefully filed away. In such a case, no welding should be done which is not permitted by law or by good practice. In case of marine work, the welder should pass the regular examination of the Federal Steamboat Inspection Service. In all cases, the welder should make friends of the insurance and other inspectors by refusing to do work unless authorised by them, by being conservative in what work he recommends, and by doing nothing except a first-class job.

Aids to Organic Synthesis

New Books Reviewed by Professor G. T. Morgan

THE SYNTHESIS OF BENZENE DERIVATIVES. By Stanley C. Bate. Ernest Benn, Ltd. 1926. Pp. vi, 229. 21s.

In this concise guide to the laboratory production of aromatic compounds, the author has confined himself to a consideration of monocyclic derivatives of benzene. A short chapter on the benzenoid hydrocarbons themselves is followed by a longer section on nitration which contains many well-chosen typical examples of this important general process of substitution. The extensive literature on aromatic amines has been carefully gleaned to supply many interesting preparations of these widely employed intermediates. The diazo-reaction is of fundamental importance both in organic synthesis and in the arts and manufactures, so that a consideration of diazo-compounds follows naturally after the discussion of primary aromatic amines. Chlorination and sulphonation offer direct means of substitution in the benzene series, and the resulting chloro-compounds and sulphonic acids are essential reagents in many aromatic syntheses, which are dealt with by the author in a logical and lucid manner.

The subsequent sections are devoted to the aromatic alcohols, aldehydes, ketones and carboxylic acids, whereas the concluding chapter introduces triphenylmethane and its colour-producing derivatives. Throughout the book there are numerous references to scientific and technical memoirs, and it thus affords a complete and suggestive summary of the chemical reactions applicable to the benzene series.

ORGANIC SYNTHESES. Vol. V. John Wiley and Sons, Inc., and Chapman and Hall, Ltd. 1925. Pp. 110. 7s. 6d.

This volume, which is the fifth part of an annual publication of satisfactory methods for the preparation of organic chemicals, is compiled by an editorial board consisting of seven American chemists assisted by many contributors located both in Europe and in the United States. So far, five members of the "big seven" have acted as editors-in-chief, and the present issue has been edited by C. S. Marvel.

The treatise under review contains descriptions of thirty-three preparations submitted by eighteen contributors and checked independently by members of the editorial board and their colleagues, so that the approved processes embody the best known conditions for obtaining the products in high yield and in a state of purity. Improvements discovered since the publication of earlier volumes of the series are being incorporated, and in the present instance a new recipe is given for the production of ethyl oxalate.

The selections, which are distinctly unconventional and made apparently somewhat at random, comprise a wide variety of types and should consequently appeal to a large circle of organic chemists. Several useful preparations are given of aliphatic derivatives including adipic and acetone-dicarboxylic acids and pinacol and pinacolone. In the aromatic series, the synthesis of isatin from aniline, hydroxylamine and chloral hydrate is of outstanding importance. The increasing interest in products of bio-chemical significance is suggested by the inclusion of processes for the isolation of *l*-cystine and *d*-glutamic acid from keratin and wheat flour respectively. Each description contains practical notes and references to other methods of preparation; the index is a guide not only to the present volume but also to earlier issues of this useful publication.

THE USE OF SOLVENTS IN SYNTHETIC ORGANIC CHEMISTRY. By D. W. MacArdle. Chapman and Hall, Ltd. 1926. Pp. vi, 217. 15s.

This volume, which is planned as the first part of a more comprehensive treatise, is a compilation dealing with the general problem of bringing reagents into a state of solution suitable for the operations of organic chemistry. The ordinary organic media are reviewed, special attention being devoted to the preparation and purification of alcohols, ethers, organic acids, esters, ketones and organic bases. Occasionally inorganic solvents are employed in effecting the solution of organic materials, and typical instances are given.

In the chapter devoted to aliphatic and aromatic hydrocarbons the author deals incidentally with solvent of crystallisation. Benzene frequently makes it appearance in such combinations, but instances of paraffins behaving in this way are much rarer, so that the cited solvation of triphenylmethyl with heptane, decane and other saturated hydrocarbons is of especial interest. This matter of solvent of crystallisation is such an important phenomenon in the use of solvents that in a subsequent edition of this treatise it might be given a separate chapter.

The sections on special means of inducing crystallisation and salting out contain valuable technical data. A full bibliography is collected at the end of the book in a convenient summary and the information in the text is rendered easily available by the provision of three indexes tabulating authors, solvents and subjects.

G. T. M.

RECENT ADVANCES IN PHYSICAL AND INORGANIC CHEMISTRY. By Alfred W. Stewart, D.Sc. Fifth Edition. London: Longmans, Green and Co. Pp. 312. 18s.

The last few years have been so full of scientific activity that the publication of a new edition of Professor Stewart's book has entailed a very extensive revision of its contents. The new chapters number a dozen, dealing with hafnium, the isobares, the results of mass spectrography, the segregation of isotopes, atomic structure, active hydrogen, new hydrides, the effects of intense drying, and Tesla-luminescence spectra. These additions have, of course, entailed the disappearance of a corresponding amount of the old text, and the remainder, dealing with such matters as X-ray spectra and atomic numbers, the rare earth elements, isotopes, radioactivity, etc., has been brought up to date. To enable the reader who desires to do so to pursue the subject at further length, many references to the original literature are given.

The chapters have been very carefully prepared, and provide excellent summaries of the fields with which they deal. Nowadays, scientific literature is poured out in such a copious stream that very few of us are able to keep abreast of it; and books which summarise the more recent movements become a necessity not only to the scientific and technical worker, but also to the student, who can, for a happy moment, forget what Fischer did in '85 in order to read what Rutherford is doing in '26. In another direction also this publication will be of value; the fusion into a connected whole of references scattered throughout the literature always brings a subject into its proper perspective, and indicates new connections, so that even the reader familiar with the subject is enabled to see directions in which it may be further developed. Speculations arising from such a point may well be the beginning of a useful piece of research.

THE FUNDAMENTAL CONCEPTS OF PHYSICS IN THE LIGHT OF MODERN DISCOVERY. By Paul R. Heyl, Ph.D. London: Baillière, Tindall and Cox. Pp. 112. 9s.

This publication forms a reprint of three lectures delivered in 1925 at the Carnegie Institute of Technology, Pittsburgh. The author combines a deep knowledge of the physical sciences with a gift for exposition; he traces the changes, not only in the aspect of physical science, but in our attitude towards it from the eighteenth century ("the century of materialism"), through the nineteenth century ("the century of correlation", to the present "century of hope." Readers, lay and scientific, who wish to obtain a broad view of the development of some of our fundamental ideas will find much to interest them.

ELEMENTARY QUALITATIVE AND VOLUMETRIC ANALYSIS. By F. H. Campbell, D.Sc. London and Melbourne: Macmillan and Co., Ltd., in association with Melbourne University Press. Pp. 99. 6s. 6d.

The qualitative analysis dealt with is that of simple salts and such double salts as alums and vitriols; oxalates and phosphates (except those of sodium, ammonium and potassium) are excluded. This course has been followed at the University of Melbourne for many years, and is calculated to facilitate the acquisition of habits of accurate observation by the student. The section on volumetric analysis is intended for students who are unable to use a chemical balance.

The Milk Industry in Germany

Pasteurised, Dried, and Condensed Milk

THE sale of milk carefully pasteurised and delivered in sealed bottles is much more prevalent in Germany than in this country. In most of the large towns it is quite exceptional for milk to be delivered in its original raw state as received from the farmer. The manufacture of pasteurising and milk-drying machinery is quite a large industry, and considerable improvements have been effected in the machinery and processes used during recent years. In the Degerma process, introduced by the large firm of dairy machinery manufacturers, Max Schultz A.G. of Oldenburg, the milk, after a preliminary pasteurisation, is further subjected to the same process in steel bottles packed in cases which are passed automatically through a large water-bath of oblong form, and maintained at a temperature of 64-65° C. for about 30 minutes. The right temperature is insured by means of a circulating pump. The cases of bottles are then passed through another similar tank in which they are exposed to jets of cold water for rapid cooling. The Ahlborn Co. of Hildesheim has introduced a special pasteurising plant consisting essentially of several compartments, usually four, surrounded by a water jacket which is heated by direct steam passing through perforated plates. The milk is previously centrifuged and heated, and each compartment of the apparatus is provided with propeller stirrers and with automatically working valves so that the compartments are emptied and filled again every quarter of an hour. The usual capacity of these machines is 6,000 litres per hour. The cooling is effected in a closed tube system. Another method of pasteurisation is the Hako process of Junemann & Co. A.G., Oberscheden, which differs from the Ahlborn in consisting chiefly of concentrically arranged compartments through which the previously heated milk passes within definite limits of time and temperature, but without any external heating. A third system is the Biorisator process of Dr. Lobeck. Here the milk is pumped first into a pressure vessel, and thence under a few atmospheres pressure is passed or sprayed into the biorisator, which is heated by means of a steam jacket up to 76° C. It is then passed through a rapid cooler into the bottle-filling machine. Milk so treated is said to be superior in keeping qualities to ordinary pasteurised milk.

Continental Vigilance

The ideal milk supply is that of full cream milk from perfectly healthy cows delivered to consumers at a moderate price under conditions which are found, for example, in many towns in Denmark. In Germany such a milk supply is not, perhaps, quite so general as in Denmark, except in the largest cities. In Leipzig there is a special milk-testing institute (Milchhygienische Untersuchungs- und Kindermilch-anstalt) which is doing very good work in maintaining a high standard of milk supply in that city. Numerous tests are undertaken to determine the amount of dirt, fat and catalase in the milk, also bacterial counts and microscopical examinations are made.

Condensed milk is usually manufactured by the methods employed, for example, by the firm of E. Passburg, Berlin. Full milk or best quality skimmed milk is passed from the collecting tank through a filter or a centrifuge into a pasteur, where it undergoes preliminary heating up to 85° C.; thence into a vacuum evaporator, a tin-lined copper vessel of 6,000 litres capacity, with vacuum pump attached, and maintained at a temperature of 55° C., where the milk is reduced in volume to the extent of one quarter or one half of its original volume. If sweetened milk is required a concentrated cane sugar solution is prepared in an adjoining tank, fed into the evaporator and there treated with the milk. This operation requires extreme care, otherwise sugar crystallises out and makes the resulting milk preparation gritty to the taste. After the required degree of condensation is arrived at—as tested by sampling—the milk is conveyed to a homogenising machine, then cooled, and finally delivered to the bottle-filling machine, where it is sealed into tins of about 450 to 500 c.c. size. The process is easily made a continuous one.

Dried Milk Powder

For the production of dried milk powder several processes are used in Germany. In the Just-Hatmaker method the apparatus consists essentially of two cylinders or drums rotating in opposite directions and heated. On these the milk forms a dried film and is scraped off. The E. Passburg method is somewhat similar, except that one heated cylinder only is used. In the spray process of the Trufood Company the milk is sprayed through fine nozzles into a chamber through which a current of hot air is passed. The dried milk falls to the bottom in fine powder. In the Krause process of the Metallbank u. Metallurgische Ges. of Frankfurt a/M. the milk is sprayed on to a rapidly rotating disc at 12,000 r.p.m. (revs. per minute) and dried in an air current at 130° C. In the Union process of the Trockenmilch Verwertungs-Ges. G.m.b.H. of Berlin the milk is atomised or sprayed by means of compressed air and dried in a hot air blast at 100°. Although the air current is in these cases introduced at a fairly high temperature the actual temperature at which the drying takes place is much lower, say, in the neighbourhood of 40° C., owing to cooling due to rapid evaporation. Whilst a certain amount of milk powder is used in Germany for reconstruction into ordinary milk for drinking, the greater part is intended for the manufacture of milk preparations, such as milk chocolate and confectionery generally.

Another Synthetic Nitrogen Plant?

A Suggestion to Sir Alfred Mond

PROFESSOR G. G. HENDERSON, President of the Institute of Chemistry, was in the chair at the annual dinner of the local section of the Society of Chemical Industry, the Institute of of Chemistry, and the Newcastle Chemical Industry Club, held at Newcastle last week.

Submitting the toast "The Society of Chemical Industry and the Newcastle Chemical Industry Club," Mr. Clive Cookson said that we were now living absolutely in the days of chemists. The old rule-of-thumb men had disappeared, and now we had chemists who were not luxuries but necessities.

Dr. H. Levinstein replied to the toast, and Sir George Renwick gave "The Institute of Chemistry," complimenting the chemists on the enormous development in their profession. Sulphate of ammonia, he said, was now being produced from the air at works near Stockton. They were producing 100 tons per day, and when Sir Alfred Mond was in Newcastle recently he had asked him if he could not establish some works on Tyneside. Sir Alfred replied that he was not sure, but he would think about it. "I wish he would," remarked Sir George. "I assured him that we had an atmosphere which I thought would contain more ammonia than at Stockton."

Professor G. G. Henderson acknowledged the toast and said that it was no exaggeration to say that chemistry to-day was absolutely indispensable to the business of government, whether national or local. There was not a single productive industry which was not ultimately dependent on the work of the chemist, yet their fellow-citizens, outside Newcastle at least, did not generally appreciate the fact.

Death of Mr. A. T. Smith

THE death occurred on Thursday, April 1, at Liverpool, of Mr. Andrew Thomas Smith, general manager of the Castner Kellner Alkali Co., Ltd., and a prominent figure in the heavy chemical trade. He had not been well for some time, and his failing health was attributed largely to his unstinting sacrifice and devotion to his work during the war.

Early in his business career Mr. Smith joined the chemical firm of Pilkingtons, leaving them when their business was absorbed. After some years in business on his own account, during which time he took an active part in the formation of the Castner Kellner Alkali Company, Ltd., he eventually became first their general manager and from 1916 to the day of his death was managing director. Mr. Smith's energy, abilities, and courage are demonstrated by the striking success of the Castner Kellner Company. In addition Mr. Smith was a director of Brunner, Mond and Co., Ltd., Electro Bleach and By-Products, Ltd. (of which he was chairman), and the Synthetic Ammonia and Nitrates, Ltd., and took an active part in all the societies connected with industrial chemistry.

He was a J.P. and a county councillor of the County of Chester, and for several years chairman of the Urban District Council of Runcorn.

The Chemistry of Breadmaking

Research on Yeast Properties

SOME interesting facts on the chemistry of breadmaking, arrived at as a result of research undertaken at the National Bakery School, London, by Dr. C. Dorée and Mr. J. Kirkland, are contained in a pamphlet recently issued by the Master Bakers' Association. The research was conducted as an investigation of certain properties of yeast, the influence of water, and the effects of bleaching in breadmaking.

If a dough or a sponge is fermenting over a long period, the bakehouse practice is to use a proportion of yeast considerably less than would be employed for a shorter period, the inference being, by general agreement, that there is an actual production of new yeast, and that the work of fermentation in the dough in its volume and in its effects is done by that new yeast. However, the greatest difficulty arises in accurately measuring that increase. The method adopted in the series of experiments undertaken was to estimate the quantity of yeast in a dough, at given periods, from the amount of work done, on the assumption that there can be no other agent present from which such work energy could be obtained.

The work done in each case was measured by the expansion of a ferment, made of standard density with a small proportion of yeast, and under certain conditions easy to produce and to control. The "ferments" of standard composition consisted of 20 grams flour, 30 cubic centimetres tap water, and 2 grams yeast. The standard conditions were that the ferment to be compared was made with water at tap temperature and poured into graduated glass cylinders, and at once placed in an incubator, or a water-bath, maintained at a fixed temperature of 84° F. and fermented under that condition for exactly one hour. The temperature of the ferments when newly mixed was ascertained, and again at the end of one hour. At the end of that period, one-half (by weight) of the material was taken out and mixed with the standard quantity of flour and water—20 grams of the former and 30 grams of the latter—and poured again into a clean, graduated cylinder, and, after its height and temperature were carefully noted, it was placed in the incubator, at the same temperature as before. At the same time, the other half of the original ferment, after its height was taken, was also incubated.

Experimental Method

The work done by the yeast was measured in terms of the volume of gas produced from the sugar in the flour, and that volume had a constant relation to the weight of sugar broken down. As the flour was the same in all the ferments, each standard quantity contained the same weight of sugar. The assumption was made that none of the gas produced was lost at the top of the ferment, or, alternatively, that if there was any lost, it was likely to be the same in each ferment; therefore a fair comparison between them was not vitiated. The ferments were not allowed to rise to the height at which they actually break, but only for the standard time of one hour, so that they still remained whole and the total expansion could be noted. To ensure that the ferment would bear the strain for one hour without breaking, it was necessary to use a strong flour.

If the second ferment had risen to half the extent of the first one, that might be considered as evidence that in the first there was no appreciable increase in yeast, no creation of new cells. But if the volume of the second had appreciably increased more than half the volume of first one in same time, then it was equally good evidence that there has been a creation of new yeast cells, and, roughly, the extent of the new growth should bear a calculable ratio to the increase in volume of the second ferment; that is, to the volume of gas produced in a given time. By halving this second ferment, and putting that in a new one, of standard quantity as before, and fermenting that for another hour, the continued creation of new yeast and its quantity was ascertained.

The result of experiments on the influence of water coincided with practical experience, viz., that water of the qualities ordinarily used in this country, in the quantities used, has very little effect on the bread made or the process of making it. It might be thought that the use of alkaline (hard) water would reduce the acidity of the dough with consequent disturbance of the processes involved, but the assumption is not borne out by direct evidence. If sufficient alkaline water were mixed with the dough as to give an alkaline condition the activities of the yeast, the diastase and the lactic acid bacteria would be so restrained that the production of gas and acidity would be very slow and the time necessary for ripening greatly increased. The following calculation will show, however, that there is little chance of the alkaline condition being realised with any ordinary hard water. Assuming a mixing of 15 gallons of water to the sack of flour and the water to have 20 degrees of temporary hardness, *i.e.*, 20 grains of calcium carbonate per gallon, calculation shows that the 15 gallons contain 300 grains (19·5 grams) of chalk in all, which is able to neutralise 390 c.c. of Normal sulphuric acid. The flour, however, is acid; it is able to neutralise alkalinity, and its value in this respect is equivalent, at the least, to 0·1 per cent. of its weight of sulphuric acid. The 280 lb. of flour, therefore, supplies acidity equivalent to 2,550 c.c. normal sulphuric acid.

Effects of Bleaching

In 1912, a report on "Bleaching of Flour and the Addition of So-called Improvers," prepared for the Local Government Board by Dr. J. M. Hamill, stated that it seemed probable that bleaching, when carefully carried out, produced no appreciable effect upon the baking qualities of flour. The report of detailed investigations undertaken at the National Bakery School, however, hardly bears out that opinion.

The purpose was to discover with some precision whether bleaching actually changed the properties, other than colour, of the flour, especially in the matter of increasing the volume of the loaf. If it did, the small ferment should work for a longer time without breaking; if it did not, it should break before that made with unbleached flour. The tests were performed in series, with a "control" containing unbleached flour in each case, and the results very plainly indicated that slight bleaching of the flour with nitrogen peroxide gas—that is, with from 0·6 to 0·9 of gas to 10,000 of flour—makes it really easier to ferment. That quantity of gas has intensified its elasticity. But when the proportion of gas was increased some corrosion of the gluten of the flour did take place, and the ferment broke before it reached normal height. Corroboration of this corrosion and softening of the flour gluten was also obtained from other sources. The inelastic (short) nature of the gluten of the flour which has been bleached with the higher proportion of gas—much overbleached—is very pronounced. When chlorine was used, the effects of bleaching were not so pronounced, but the direction of the effects was the same.

"Formite" Bakelite

"FORMITE" Bakelite Resin "A," prepared by the interaction of carbolic acid and formaldehyde, forms, when incorporated with various fillers, convenient moulding materials. These may be readily fused and moulded into definite shape by means of heat and pressure in specially constructed moulds, being finally hardened by further heating. The mouldings thus prepared possess high electrical properties, are infusible, and insoluble in most solvents. The makers of these moulding materials, the Damard Lacquer Co., Ltd., of Warwick Road, Greet, Birmingham, have issued a brochure describing their products. The brochure deals, among other matters, with the various grades of "Formite" Bakelite moulding mixture, and with the hydraulic presses, heating apparatus, moulds, and other machinery used in preparing the mouldings; it gives also many useful hints with regard to the design of mouldings.

Chemical Catalog Book Prices

THE Chemical Catalog Co. of New York, in an announcement published in this issue, states that it has been its constant aim to supply its scientific and technical books to British customers at the retail prices charged for them in the United States. Owing to certain difficulties which British customers have hitherto experienced the company has now decided to cancel its agency arrangements with all booksellers in Great Britain with the exception of Mr. Arthur F. Bird, who will have the exclusive sales agency of the company's publications in this country and who is authorised to see that they are not resold at a price greater than that prevailing in the United States.

From Week to Week

THE CHEMICAL SOCIETY OF JAPAN has produced a monthly bulletin containing short chemical papers and abstracts. This development is the result of a gift to the Society from Professor Ikeda.

THE INCREASE in German petrol prices by three marks per 100 kilogs has led German benzol producers to raise their prices to a similar extent. A new benzol-petrol mixture known as "Aral" is reported to have had a good reception.

THE SALE BY AUCTION, without reserve, will take place on Tuesday, April 20, of the plant and machinery of the Watson Fairbairn Chemical Co., Saltney, near Chester, in voluntary liquidation. Details of the stock will be found in our advertisement columns.

THE DROPPING OF INSECTICIDES by aeroplanes on the U.S. cotton fields is to be extended as results have been very successful. According to the U.S. Bureau of Entomology, Department of Agriculture, 50,000 acres of cotton were dusted in this way with calcium arsenate during last year.

THE PRODUCTION of high grade ethyl acetate is to be undertaken by the Canadian Electro Products Co. at Shawinigan Falls, Quebec. Demand has increased recently, particularly for lacquer manufacture, but it is anticipated that the new source will produce sufficient to permit of export.

THE HARDINGE CONICAL MILLS are the subject of a new booklet, H.600, just produced by International Combustion, Ltd., London. It is illustrated, and deals with the principles of operation, types, applications, etc., of these well-known mills. The advantages of the conical mill are set out in concise form.

THE DANGERS of fruit tree washes containing arsenate of lead are outlined in a communication by the Ministry of Agriculture and Fisheries. Such washes are stated to be of the greatest value in the suppression of pests, but they should not be used when the trees are in blossom, as they result in a high mortality amongst the bees.

SYNTHETIC NITROGEN is to be produced by the arc process in New Zealand at a proposed site on Smith Sound, South Island. Water power will be taken from Lake Manapouri and is expected to produce 50,000 h.p. Calcium cyanamide will be the principal product, and it is anticipated that it will find a large market in Australia as a fertiliser.

FERTILISERS especially suited to sugar beet production were discussed at a meeting of the Salop Agricultural Committee on Tuesday. Practical research had shown that sugar beet required a general mixed fertiliser containing nitrogen, phosphates and potash. An extra dressing of nitrogen was found to increase the yield but to depress the sugar content of the crop.

VISCOUNT ULLSWATER was re-elected president of the British Sugar Beet Society, Ltd., at the general meeting in London recently. Mr. Walter Guinness, at a subsequent luncheon, said that they need not believe the industry was doomed at the end of nine years' subsidy. The training of British technical chemists and managers to displace foreign experts was advised.

APPLICATIONS ARE INVITED for the post of head of the Department of Chemistry at the Polytechnic, Regent Street, W.; applications to be made on form obtainable for stamp from the Director of Education before April 19. The appointment of Dr. E. C. Edgar from the position to that of Principal of Rutherford Technical College, Newcastle, was reported in THE CHEMICAL AGE of March 13.

THREE MEMBERS of the Kodak Research Laboratories—Dr. C. E. Kenneth Mees, Mr. John L. Crabtree (a graduate of Victoria University, Manchester), and Dr. Merle L. Dundon—have been decorated by the French Photographic Society for valuable research work in photography. Dr. Mees was also awarded the Janssen medal in 1924, being the first person other than a French scientist to receive it.

THE OPTICAL CONVENTION, 1926, which opens on Monday next and continues until Saturday, April 17, will be held at Imperial College, South Kensington. There will be general meetings, papers, and discussions every day, the subjects including all phases of glass manufacture and qualities, theory and technique of colorimetry, colour tests, microscopic developments. The President of the Convention is the Astronomer Royal, Sir Frank Dyson, and the secretary is Mr. T. Martin, M.Sc., 1, Lowther Gardens, Exhibition Road, South Kensington, S.W.7.

AN INQUEST was held at Walsall on Wednesday on the death of a child who fell into an acid pit on some waste land adjacent to the works of W. H. Bodin and Co., galvanisers, Wolverhampton Street, Darlaston. The child swallowed some of the liquid which was stated to be dilute hydrochloric acid that could not be turned into the street sewers. It was not sufficiently strong to burn the skin. There was a fence in bad repair round the land but the coroner pointed out that there was no obligation on the part of anyone to fence land and persons trespassing did so at their own risk. A verdict of "Accidental Death" was recorded.

MR. J. G. DELY has resigned his position as chief chemist of the Atmospheric Nitrogen Corporation, New York.

MR. J. E. G. COOK, for many years the South Coast representative of the County Chemical Co., London, has joined Capon Heaton and Co., Ltd., rubber manufacturers, Birmingham.

A GENERAL MEETING of firms interested in the formation of a research association for the paint, colour, and varnish industries will be held at the London Chamber of Commerce, Cannon Street, E.C., on April 14, at 11 a.m.

MR. W. E. MORTON is recommended to fill the Chair of Textile Technology at Manchester University vacant by the death of Professor W. Myers. Mr. Morton has been working under Dr. A. W. Crossley at the Shirley Institute.

MR. P. F. TURNER has been appointed soil chemist for research work in connection with the insect pests that damage sugar cane. This appointment is made by the Trinidad Government following the report of a special committee of investigation.

SIR MAX MUSPRATT, who is at present in Spain, was invited to attend a banquet at Huelva on Monday at which the King of Spain was present. Sir Max attended as chairman of the United Alkali Co., Ltd., which owns the Buicron Railway and various copper mines in the neighbourhood.

MR. H. R. BRITON-JONES has been appointed Professor of Mycology to the Imperial College of Tropical Agriculture, Trinidad. He was Mycologist to the Egyptian Government from 1919-1922, and subsequently Research Mycologist at the Research Station, Long Ashton, University of Bristol.

THE NITROGEN PRODUCTS CO. of Seattle, Wash., has notified the Muscle Shoals Joint Congressional Committee that it expects to submit a bid for the lease of the property. The company is now operating a small plant for the recovery of air nitrogen, the product being sold in the form of sodium nitrite.

THE CARNEGIE HERO TRUST FUND is to inscribe the name of Alfred Welding on its roll of heroes, and he will be presented with a sum of money and an inscribed silver watch. Welding, an employee of High Speed Alloys, Ltd., Widnes, on October 1, 1925, jumped into a vat of vanadic acid and rescued a youth. He has already been awarded the Edward Medal by the King.

REPORTS FROM MOSCOW state that a board meeting of the Chief Chemical Committee was of the opinion that the Kara-Bugaz sulphate, in the Caspian Sea, would be of great importance in the near future. The board made a grant of about 443,000 roubles to the Prodasilikat to organise an expedition to settle technical questions on the site. Plans were also discussed for the building of an ozokerite factory at Sel-Rokho.

JUDGMENT FOR £75 WITH COSTS was awarded recently to Miss Bertha Hart, of Peckham, against Normelle, Ltd., of Peckham, for damages in respect of a fur-collared coat which, she alleged, produced dermatitis. It was stated in evidence that the dye used for skins contained the same element that caused injury when present in certain hair dyes. The dye was harmless if properly used. It was applied intensively to the fur and then oxidised. If the excess of dye were removed the fur was harmless.

A BILL TO ENCOURAGE the establishment of the wood pulp paper industry near Burnie, in North-West Tasmania, has been passed by the Assembly. It is understood that English capital is interested, and will take over assets formerly acquired by the Amalgamated Zinc Co., which has abandoned its project. The Government is authorised to guarantee the interest for twenty years on £250,000 debentures. The construction of plant must be commenced within the year, £200,000 spent within two years, and a further £300,000 within the succeeding three years.

BIRMINGHAM'S CITY ANALYST, Mr. J. F. Liverseege, in his annual report, states that three of the nine samples of fertilisers examined were satisfactory; three samples either failed to give the statement of composition required by the Act or the statements given were incorrect. One had 1·32 per cent. of nitrogen more and 1.16 per cent. of phosphates less than that guaranteed. In two other samples the citric soluble phosphates were much higher than the amount guaranteed, but the official regulations provided no limit of error for this constituent. A sample of bone meal fertiliser was sold without any statement of its composition. Two samples of sulphate of ammonia for gardening were unadulterated, but no statement was given as to the nitrogen content.

THE RECENT DISCOVERY of a rich gold reef in Panama by a British expedition and of the concessions granted to British interests were outlined to pressmen in London on Tuesday. Mr. D. Elliott Alves made a statement as chairman of the Panama Corporation and with him were directors, including Mr. Henry Mond and Mr. Peter Matthey, chairman of Johnson, Matthey and Co. Sir Alfred Mond is also understood to be actively interested. Mr. J. J. Calderwood has investigated the prospects and alluded to the possibilities of silver and zinc mines also. It is intended to open operations as soon as the Corporation is formed. It will have a capital of £2,000,000 and will act as a holding company.

A POLISH MATCH MONOPOLY has been passed into law. Matches, including wax matches, stearine, wax, etc., may now only be manufactured in factories the property of the State Match Monopoly. Importation of such materials is prohibited.

A TOTAL COLLAPSE of the Swedish beet sugar industry is foreseen as a result of labour trouble. Forty thousand people are unemployed in the industry, and there is a loss of 100,000,000 kroner (about £5,600,000), according to Stockholm reports.

FIRMS SUPPLYING PAINTS, etc., to the India Stores Department, Delhi, are invited to study a pamphlet produced by that Department outlining specific requirements and now available at the Department of Overseas Trade, Old Queen Street, London.

THE DYEMAKING FIRM of Muhlheim vorm. Leonhardt and Co., of Muhlheim on Main, has ceased operations. The workmen and staff have been transferred as far as possible to the plant of Leopold Cassella G. m. b. H., which firm controls the capital of the Muhlheim concern.

IT IS REPORTED THAT the Government's decision in regard to assistance for the low temperature carbonisation of coal will be published in a few days. The Government is believed to be disinclined to give financial aid to private companies or research workers, and it is deemed unlikely that grants will be made under the Trades Facilities Act.

NO DUMPING of crimson antimony sulphide from Great Britain on the American markets was found by the U.S. Treasury Department after investigation. It was found, however, that while American producers were unaffected by Great Britain, there was considerable competition from other countries using a cheaper process.

A SATISFACTORY OUTLOOK was reported at the annual general meeting of Associated Portland Cement Manufacturers, Ltd. Sales had increased and production costs decreased, and Ferrocrete rapid hardening Portland cement had been very successful. Reconstruction of Bevan's works was almost complete and the Medway works had also been reconstructed.

THE BOHEMIAM GLASS INDUSTRY has of late suffered from the general decline of employment. Export especially shows a marked decrease, mainly owing to the new increased Customs duties in Germany. In January, when all these new increases had not entered into force, exports to Germany showed a decrease of 200 wagons, and since then the situation has grown worse, especially in the hollow glass industry. Many firms have, it is stated, reduced their production, and in some cases workers have been dismissed.

LEVER BROTHERS, LTD.'S REPORT for 1925 was issued on Wednesday. It states that a factory in Japan which was showing losses, was sold at a profit, and also the company's interest in the businesses of "Sanitas" Co., Ltd., W. Woodward, Ltd., and the Neptune Oil Co., Ltd. (Australia), which the directors did not think could be operated to the best advantage in conjunction with the principal industries of the main and associated companies. In June last the directors released in favour of the Niger Co., in which Lever Brothers hold over 98 per cent. of the ordinary share capital, a reserve of £1,023,250 to eliminate a debt balance, the Niger Co. now being on a profit-earning basis. Financial details will be found in our "Company News" column.

AS REPORTED IN FEBRUARY a fusion has been completed among the leading firms of the chemical and pharmaceutical industry and wholesale druggists in Austria. It is now learned that this move takes the form of a syndicate known as the Chemosan-Fritz-Petzold-Union in Vienna and is made up of the former Chemosan A. G., the Vereinigte Drogengrosshandlungen A. G. and R. Fritz—Petzold u. Suess A. G., and the Philipp Roeder-Bruno Raabe A. G. These concerns have affiliations also in Czecho-Slovakia, Germany and Hungary. The new company will act under the patronage of the banks which previously supported the foundation companies and the same directors and experts will continue in service. It is hoped that internal competition will thus be eliminated and sales simplified.

CHEMICAL TENDERS ACCEPTED include :—International Combustion, Ltd., grinding and pulverising department; ten super-Raymond mills have been ordered by Barking Power Station for grinding bituminous coal. Other recent orders include :—A No. 00 Raymond pulveriser for grinding litharge, for Italy. A No. 2-roller high side Raymond mill for grinding ochre, for France. A No. 0000 pulveriser for grinding sulphur, for England. A Raymond separating plant for separating barytes, for India.—The Woodall-Duckham Vertical Retort Co. have received orders from the Gas Light and Coke Co., Ltd., and Birmingham Gas Department for gas making plant of a total value of £250,000.—Mirrlees, Watson and Co., Ltd., of Glasgow (recently amalgamated with Mirrlees, Bickerton and Day, of Stockport), have secured a contract for distilling plant, for a site on the port of Jeddah, in face of severe Continental competition. The plant will be the fourteenth of its kind to provide fresh water from sea water supplied by this company to various places on the Red Sea.—The International Electrolytic Plant Co., Chester, has received orders for plant for hydrogen and oxygen production for France and America.

THE DYE AND CHEMICAL CO. OF CANADA, LTD., Kingston, Ont., expect to manufacture 90 per cent. of Canada's carbolic acid requirements this year.

TO PREVENT OUTSIDE OIL INTERESTS exploiting the Australian market, the Commonwealth House of Representatives has passed a Bill increasing the capital of the Colonial Oil Refinery by £100,000.

FORMAL NEGOTIATIONS for a commercial treaty between Japan and Germany are expected to begin shortly as a basic agreement is reported to have been reached on the question of the dye industry and trade, which matter was the chief cause of difference.

DR. BUCHER, head of the new German Dye Trust, is reported to be visiting the United States again shortly. There are rumours that several chemical plants are to be established in America by the German concern, but no official confirmation is available at present.

THE NEW DIRECTORATE of Vickers, Ltd., which, by the suggestion of an outside committee of investigation, wrote down its capital by 12½ million pounds last December is: Mr. Douglas Vickers, president; Sir H. A. Lawrence, chairman; Sir David Yule, Mr. M. W. Jenkinson, and Mr. G. R. T. Taylor.

SIR WILLIAM GLYN-JONES has tendered his resignation as secretary and registrar of the Pharmaceutical Society of Great Britain, as he has accepted the chairmanship of the Council of the newly formed Canadian Articles Trade Association, and will live in Canada. He is an acknowledged expert on drugs and poison legislation

A BOILER EXPLODED at the Hoesch cellulose works, Dresden, on Wednesday. Seven people were killed, fifteen injured, and two are missing.—Tanks belonging to the Union Oil Co. at San Luis Obispo, Cal., and containing 3,700,000 barrels of oil were fired by lightning on Wednesday. The damage is estimated at £2,000,000.

THE BESSEMER GOLD MEDAL of the Iron and Steel Institute has this year been awarded to Sir Hugh Bell, the well-known ironmaster and collier owner of Middlesbrough and Durham. The award is made for outstanding services in the advancement of the manufacture of iron and steel. Sir Hugh is a director of Brunner Mond and Co., Ltd.

A PLEASING CEREMONY was carried out on Thursday, April 1, to mark the seventieth birthday of Colonel Sir Edward Brotherton. The head office staff of Brotherton and Co., Ltd., Leeds, presented him with some fine specimens of cut glass, and each member of the staff afterwards visited Sir Edward in his office to convey a personal message of congratulation.

SIR AUCKLAND GEDDES, who presided at the general meeting of the Rio Terito Co., Ltd., in London on Wednesday, said that the company had had a good year. Their quota in the Pyrites Producers' Association would give them about the same deliveries as last year. The board had, however, decided not to continue after 1928 in an association working on the lines of the present one, or under comparable rules. They believed that by its efforts to raise prices the association had increased the amount of competition which the members had had to meet, and that it was better policy for the company to market large quantities of sulphur at a reasonable price and get its copper and other metals turned into cash.

SEVERAL ARTIFICIAL DEVELOPMENTS are reported from abroad.—A factory is under consideration at Oslo, Norway, the cellulose to be obtained locally, the machinery from Germany, and the patent rights probably from Italy.—The Società Anonima Viscosa Vercellese is to be wound up and its assets transferred to the Società Anonima Italo-Olandese Enka. Thus Seta Artificiale di Cremona and Viscosa Vercellese disappear completely, their place being taken by the Italo-Olandese Enka, which will run the two mills at Pizzighettone and Vercelli.—There are now four factories in Czechoslovakia with an estimated annual output of 1·2 million kilogrammes. Exports from Czechoslovakia during 1925 totalled 655,800 kilogrammes of a value of 40 million crowns, of which 10 millions worth went to Germany, 7½ millions to England, 5½ millions to Switzerland, and 5 millions to Austria.

Obituary

MR. ANDREW THOMAS SMITH (see p. 355).

MR. FRANZ ROESSLER, president of the Roessler and Hasslacher Chemical Co., New York, aged 70.

MR. G. H. MARKELL, aged 41, vice-president and general manager of the Hercules Powder Co., of Wilmington, U.S.A.

MR. JOHN HOWARD, at Frodsham, aged 69, for many years engaged in the salt trade and a member of the firm of Reyner and Howard, salt manufacturers, Wincham, which firm was taken over by Brunner, Mond and Co., Ltd.

HERR AUGUST THYSSEN, the Ruhr coal and iron magnate, aged 85. Before the war he owned the Deutscher Kaiser Colliery with an output of 5,000,000 tons a year, and this was the centre of furnaces, salt and potash mines, and factories dealing with every allied industry. He was a self-made man.

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Abstracts of Complete Specifications

248,411. DYESTUFF INTERMEDIATES, MANUFACTURE OF. J. Thomas and Scottish Dyes, Ltd., Murrell Hill Works, Carlisle. Application date, September 8, 1924.

The usual method of preparing 2-chloranthraquinone by treating parachlor-benzoyl-benzoic acid with weak oleum involves a considerable loss of sulphuric acid, and the object is to avoid this loss. It has been found that 2-chloranthraquinone is only slightly soluble in sulphuric acid of 85 to 90 per cent. concentration, and also that if a solution of parachlor-benzoyl-benzoic acid in 90 per cent. sulphuric acid is heated to 170° C., ring closing takes place. The process therefore comprises the latter reaction, followed by a cooling of the melt and separation of the 2-chloranthraquinone by crystallisation. The acid filtrate is mixed with a further quantity of oleum or sulphur trioxide, and used for treating a further quantity of parachlor-benzoyl-benzoic acid. Several examples are given.

248,424. SULPHUR DYESTUFFS FAST TO CHLORINE, PROCESS FOR PRODUCING. S. Sokal, London. From Kalle and Co., Akt.-Ges., 23, Rheinstrasse, Biebrich-on-Rhine, Germany. Application date, November 1, 1924.

These dyestuffs, which are suitable for dyeing cotton in blue-green-black shades, are obtained by melting dioxy compounds of the aromatic series and amino-carbazols with polysulphides under pressure. The dioxy compounds referred to are those of the benzene, naphthalene, or the carbazol series, including the derivatives of these bodies. The amino carbazols include also the substitution products and other compounds capable of being transformed by means of an alkali polysulphide into amino-carbazols or their derivatives, *e.g.*, nitrocarbazols, nitrosocarbazols, or nitro-nitrosocarbazols. In an example, a solution of sodium polysulphide, hydroquinone, and 3-nitrocarbazol is heated in an autoclave for four hours to 150° to 160° C. The melt is diluted with water and the dyestuff filtered off, washed with sodium chloride solution, and purified by treating with hot alcohol. Other examples are given employing benzoquinone, and other carbazols.

248,453. GLUTAMIC ACID, AND SALTS THEREOF, MANUFACTURE OF. K. Ikeda, 16, 5 chôme Fujimichô, Kojimachinku, Tokyo, Japan. Application date, December 3, 1924.

In the manufacture of alcohol from beetroot molasses the latter is diluted, fermented, and distilled. The residue in the still is concentrated to specific gravity 1·40, and the syrupy substance obtained is known as "Schlempe." The latter is diluted and heated with sulphuric or hydrochloric acid to hydrolyse glutamine and like compounds and liberate glutamic acid. The acid gives rise to humus-like substances, which are filtered off, and the liquor is neutralised with lime. If sulphuric acid has been used the calcium sulphate produced is filtered off, and the liquor decolorised by means of animal charcoal. The liquor is then digested with an excess of lime, filtered while warm, and evaporated under reduced pressure. The calcium salt of the bibasic glutamic acid $C_5H_7NO_4CaH_2O$ separates out. The process is described in detail.

248,487. BLUISH-GREEN DYESTUFFS AND COLOUR LAKES, MANUFACTURE OF. O. Y. Imray, London. From Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. Application date, December 9, 1924.

These dyestuffs are produced by treating an 8-halogen-1:2-naphthylene-diamine-5-sulphonic acid with a ferric salt. The introduction of the halogen into the 8-position in the naphthalene nucleus considerably increases the solubility of the dyestuff, but the insolubility of the lakes prepared from them is not affected. Examples are given of the production of dyestuffs and lakes from 8-chloro-1-naphthylene-diamine-5-sulphonic acid, which is produced by coupling 8-chloro-1-naphthylamine-5-sulphonic acid with diazo-benzene chloride and reducing the azo dyestuff thus produced.

248,477. ARTIFICIAL RESINS, MANUFACTURE OF. The British Cyanides Co. and E. C. Rossiter, 49, Queen Victoria Street, London, E.C.4. Application date, December 5, 1924.

In the manufacture of artificial resins from thiourea and formaldehyde the mixture usually has an acid reaction due to the presence of formic acid in the formaldehyde. The formation of undesirable compounds during condensation is prevented by passing a current of air through the solution during the process of evaporation, which is carried out below the boiling point of water. The air is previously freed from moisture and heated.

248,513. DISTILLING PETROLEUM AND OTHER OILS UNDER HIGH VACUUM, PROCESS AND APPARATUS FOR. O. Y. Imray, London. From Zieley Processes Corporation, 7, East 42nd Street, New York. Application date, December 24, 1924.

The object is to minimise the decomposition of distillation products and to prevent contamination of the distillate with

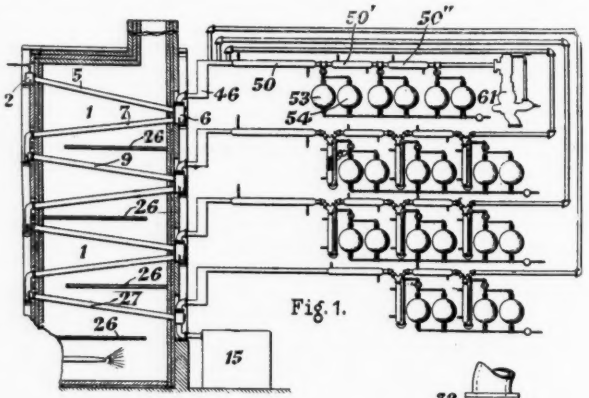
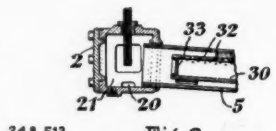


Fig. 1.



248,513 Fig. 2.

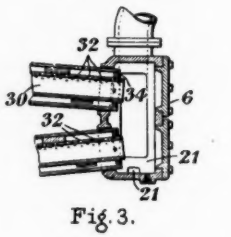


Fig. 3.

unvaporised portions of the substance treated. Oil is supplied to a header 2, which delivers it to a series of sloping conduits 5, through which it passes at about 3 to 4 feet per second. The oil is received in headers 6, and then passes through further series of inclined headers 7, 9, 27, to a residue receiver 15. The header 2 may consist of a number of sections connected by slots 20 in partitions 21, and each section supplies a conduit 5 with a relatively thin stream of oil. Hot gases are directed upwards over the conduits 5 in a tortuous path by means of baffles 26. The oil is at a temperature of about 400° F. at the inlet and 850° F. at the outlet. The distillation of the oil in thin films facilitates the liberation of vapour, and ensures that unvaporised oil is not carried over into the condensers. The conduit 5 contains an inner pipe 30, spaced from it and perforated on its upper side. The inlet end is closed by a plug 33, while the opposite end is open for the discharge of vapour. The annular space at the outlet end is provided with a plug 34, having an opening at the lower edge for the passage of the liquid only. The vapours thus pass into the inner pipe 30, and are conducted away. If any frothing of the oil takes place in the tubes, the froth is broken up by the perforations 32, and does not pass into the pipes 30. The vapours are drawn off from the headers 6 into separating towers 46,

and thence to fractionating condensers 50, 50′, 50″, maintained at different temperatures by water or steam. Each condenser is provided with a pair of distillate receivers 53, 54. The condenser 50″ is connected to a vacuum ejector pump 61, which has no seal and no moving parts so that the difficulties with the usual type of mechanical pumps due to their oil seals are avoided. The pressure in the system is maintained at 50 mm. of mercury or less.

248,519. VAT DYESTUFFS, PROCESS FOR PREPARING. S. Sokal, London. From Kalle and Co., Akt.-Ges, 23, Rheinstrasse, Biebrich-on-Rhine, Germany. Application date, December 30, 1924.

Keto compounds containing a perylene nucleus are described in Specification No. 193,431 (see THE CHEMICAL AGE, Vol. VIII, p. 348) and these keto compounds being substituted by a negative substituent are condensed with compounds containing reactive hydrogen atoms. The treatment of nitrodibenzanthrones with alkaline condensing agents is excluded. In an example, the di-imide of perylene-tetracarboxylic acid is chlorinated under pressure, and the dichloro-compound is heated with phenol and potassium hydroxide. The mixture is treated with dilute soda lye, filtered, and washed, yielding a colouring matter which forms a blue vat. In an alternative, an isodibenzanthrone substituted by a negative substituent is condensed with compounds containing reactive hydrogen atoms. Several examples are given.

248,523. MONOACYL[1] DERIVATIVES OF AMINOARYL-ARSENO COMPOUNDS, PROCESS OF MANUFACTURE OF. G. Newbery, Stanmer, Blake's Lane, New Malden, Surrey, and May and Baker, Ltd., Garden Wharf, Church Road, Battersea, London, W.11. Application date, January 6, 1925.

This process is particularly for the manufacture of monoacyl derivatives of 3 : 3[1]-diamino-4 : 4[1]-dioxyarseno-benzene. The derivatives are obtained by combining equimolecular proportions of an arylarsenic compound and an acyl-aminoarylarsenic compound. Three methods may be used : (1) an arylarsenious oxide or an aryl dichlorarsine is brought into reaction with an acylamino-arylarsine, (2) an acylaminoarylarsenious oxide or an acylamino-aryl-dichlorarsine is brought into reaction with an arylarsine, (3) an arylarsinic acid and an acylamino-arylarsinic acid are combined by reduction in admixture. A number of examples are given.

248,593. BARIUM NITRATE, MANUFACTURE OF. D. Tyrer, Stoneleigh, West Villas, Stockton-on-Tees, Durham. Application date, May 6, 1925.

The object is to avoid the disadvantage due to the small solubility of barium nitrate in water in the usual method of making barium nitrate by dissolving barium carbonate in nitric acid and crystallising the solution. It has been found that when nitric acid is added to a strong solution of barium chloride, barium nitrate is precipitated and its equivalent of nitric acid is left in solution. In an example, witherite is dissolved in hydrochloric acid to form a saturated solution, and this solution is mixed with the equivalent quantity of strong nitric acid. Barium nitrate is precipitated and removed, and the solution is used for treating a further quantity of witherite. The hydrochloric acid employed is preferably of such strength that when neutralised with witherite it forms a nearly saturated solution of barium chloride.

248,683. IRON CARBONYL, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, December 14, 1925. Addition to 244,895.

Specification No. 244,895 (see THE CHEMICAL AGE, Vol. XIV, p. 112) describes the manufacture of iron carbonyl by passing carbon monoxide over metallic iron which is obtained by reducing oxygen compounds of iron at a temperature of 100° to 200° C. and at a pressure of 50 atmospheres or more. It has now been found that a pressure below 50 atmospheres down to atmospheric pressure may be used if sufficient speed of the gas current is used to avoid the deposition of liquid iron carbonyl on the iron. Thus at atmospheric pressure iron carbonyl is formed at about 15° C., with a low speed of the gas, and the latter is considerably increased by raising the temperature. The speed of the reaction is increased by the presence of small proportions of ammonia, methanol, or formaldehyde. Oxygen, carbon dioxide or other gases which exert an oxidising action on the iron are excluded.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—226,492 (Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Reunies, Etablissements Kuhlmann), relating to manufacture of perylene, see Vol. XII, p. 185 ; 231,900 (Akt.-Ges. für Chemiewerte), relating to purification of mineral oils after treatment with acid, see Vol. XII, p. 616 ; 233,316 (Chemische Fabriken Kunheim & Co. Akt.-Ges.), relating to preparation of sodium sulphide, etc., in small lumps, see Vol. XIII, p. 18 ; 237,920 (Humphreys and Glasgow, Ltd.), relating to purification of gases, see Vol. XIII, p. 380 ; 238,205 (Consortium für Nassmetallurgie), relating to separation of lead and tin from tin-bearing ores, see Vol. XIII, p. 380 ; 238,543 (Naamlooze Vennootschap Philips' Gloeilampenfabrieken), relating to conversion of hafnium and zirconium phosphates into other compounds, see Vol. XIII, p. 402.

International Specifications not yet Accepted

246,803. DISTILLING FATTY ACIDS. H. Bollmann, 1, Alsterdamm, Hamburg. International Convention date, February 2, 1925.

Fatty acids are distilled by passing them downwards through a column filled with Raschig rings through which a current of superheated steam at reduced pressure is passed. Horizontal partitions with central openings are provided in the column.

246,817. ALKYLATED AROMATIC SULPHONIC ACIDS. I. G. Farbenindustrie. Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, January 30, 1925.

Benzene, toluene, and naphthalene are sulphonated and then treated with butyl alcohol in the presence of sulphuric acid, or naphthalene may be treated with butyl alcohol in presence of sulphuric acid. The butylated aromatic sulphonic acid is separated and neutralised with alkali to obtain the sodium salt, which is a good wetting agent.

246,827. ALUMINIUM NITRATE. S. I. P. Soc. Italiana Potassia, 3, Piazza del Popolo, Rome. International Convention date, January 28, 1925.

Aluminous material such as leucite is treated with nitric acid to obtain a solution of mixed nitrates. The crystallisation and separation of aluminium nitrate is initiated by adding a small quantity of nitric acid.

246,833-4. SYNTHETIC RESINS. Bakelite Ges., 32, Lützowstrasse, Berlin. International Convention date, January 27, 1925.

246,833. Phenol aldehyde resins are purified by the action of acids in the presence of salts such as the soluble salts of aromatic or higher fatty acids, *e.g.*, sodium salicylate, and the sodium, potassium or ammonium salts of the liquid, solid, or semi-solid fatty acids, hydroxy fatty acids, or halogenated fatty acids. In an example a resin is obtained by the action of formaldehyde, its polymers, or acetaldehyde on a phenol, cresol, or naphthol in the presence of a basic or acid condensing agent, dissolved in caustic soda solution, carbon dioxide passed through until the mass becomes fluid, and the resin precipitated by adding a soda soap solution. The carbon dioxide may be replaced by hydrochloric, phosphoric, acetic, benzoic, or oxalic acid.

246,834. The resins are purified by converting them into colloidal suspensions and then precipitating. The resin is mixed with an equal weight of water, agitated, and a small quantity of caustic alkali added to obtain the colloidal suspension. The resin is precipitated by adding sodium, ammonium, magnesium or calcium chloride, alkali carbonates, magnesium or aluminium sulphate, or alum. The salts specified in 246,833 above may be added before precipitation, and are selected to form soluble or insoluble salts with the precipitating agents. The resulting resin has a melting point above that of the original resin.

246,840. DYES. I. G. Farbenfabriken Industrie Akt.-Ges. Frankfurt-on-Main, Germany. Assignees of Farbenfabriken vorm. F. Bayer & Co., Leverkusen, near Cologne, Germany. International Convention date, January 31, 1925.

Aminoanthraquinones or substitution products are condensed with a halogen propionic acid or a substitution product

in the presence of a diluent and an absorbent for acid to obtain anthraquinonylalanines. Alternatively a halogen anthraquinone is condensed with an alanine. The alkali salts of the products are dyes for artificial silk. Examples are given of the condensation of 2-aminoanthraquinone, 1 : 4-diaminoanthraquinone, and 1 : 4 : 5 : 8-tetraminoanthraquinone with β-chlorpropionic acid alone or in a mixture of diethylaniline and chlorbenzene.

246,842. IODO-PYRIDINE COMPOUNDS. C. Räth, 42, Invalidenstrasse, Berlin. International Convention date, February 2, 1925.

2-aminopyridine is treated with an excess of iodine in alkali iodide, and then digested with an alkali hydroxide solution of 10-30 per cent. and finally the residue is crystallised from its solution in water. 2-amino-5-iodopyridine is obtained.

246,870. DIAZO PREPARATIONS. I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Assignees of Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, Germany. International Convention date, January 30, 1925.

To obtain stable, dry diazo preparations, a dry or moist diazo compound is mixed with partly dehydrated potash alum containing 8 molecules of water or aluminium sulphate containing 9 molecules of water. Diazo compounds which are nitrated are particularly suitable, and other substances may be added. Examples include moist zinc chloride double salt of 4-chlor-2-nitrodiazobenzene and aluminium sulphate, with or without the sodium salt of naphthalene tetrasulphonic acid; moist zinc chloride double salt of *o*-nitrodiazobenzene and potash alum; dry acid 1 : 5-naphthalene-disulphonic acid salt of 3-nitro-4-diazotoluene, anhydrous sodium carbonate, and aluminium sulphate.

LATEST NOTIFICATIONS.

249,834. Preparation of alcohol from olefine-bearing gases. Petroleum Chemical Corporation. March 30, 1925.

249,842. Treatment of cotton fibres preparatory to dyeing. Karrer, P. March 27, 1925.

249,849. Manufacture of new salts of alkaloids. Etablissements Poulenc Frères. March 28, 1925.

249,860. Process of decomposing salts of complex hydrofluoric acid. Meyerhofer, A. F. March 24, 1925.

249,883. Manufacture of aralkylamines and their derivatives and intermediate products. I. G. Farbenindustrie Akt.-Ges. March 30, 1925.

249,884. Manufacture of azo dyestuffs containing metal. Soc. of Chemical Industry in Basle. March 28, 1925.

249,890. Manufacture of halogenated benzanthrone derivatives containing sulphur. I. G. Farbenindustrie Akt.-Ges. March 27, 1925.

249,891. Manufacture of condensation products of the benzanthrone series and of vat-dyestuffs containing nitrogen. I. G. Farbenindustrie Akt.-Ges. March 27, 1925.

Specifications Accepted with Date of Application

224,921. Dehydrated alcohol, Method for the production of. E. A. Barbet. November 17, 1923.

242,237. Water gas, Production of. Humphreys and Glasgow, Ltd. October 31, 1924.

246,430. Cellulose derivatives, Manufacture of solutions of. Soc. pour la Fabrication de la Soie Rhodiaseta. January 20, 1925.

249,186. Steel, Production of. A. Bruninghaus. December 10, 1924.

249,309. Refining hydrocarbons. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) March 9, 1925.

249,312. Purifying coal or other gases, Process for. J. N. Reeson, and W. L. Moss. March 11, 1925.

249,370. Solid calcium nitrates, Process for the manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) May 29, 1925.

249,402. Barium hydroxide from barium sulphide, Process for the production of. A. Jahl. April 18, 1925.

Applications for Patents

Binz, A., and Räth, C. Production of iodised pyridine derivatives. 8,495. March 29. (October 30, 1924.)

Commercial Solvents Corporation. Synthetic resins. 8,888. April 1. (United States, April 1, 1925.)

Davidson, T. M. Distillation of solid carbonaceous substances. 8,590. March 30.

Davies, H. T. E. Synthetic gold. 8,408. March 29.

Deutsche Gold und Silber-Scheideanstalt vorm. Roessler. Production of heterocyclical arsenic compounds. 8,920. April 1. (Germany, April 11, 1925.)

Dreyfus, H. Manufacture of filaments from cellulose derivatives, etc. 8,435. March 29.

Hall, A. J., and Silver Springs Bleaching and Dyeing Co., Ltd. Dyeing textile materials with aniline-black. 8,694. March 31.

Heinemann, A., and Wright, D. Manufacture of carbon black. 8,794. April 1.

I. G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Reduction of iron ores, etc. 8,518. March 29.

I. G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Manufacture of colour lakes. 8,519. March 29.

I. G. Farbenindustrie Akt.-Ges. Manufacture of halogenated benzanthrone derivatives containing sulphur. 8,496. March 29. (Germany, March 27, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of benzanthrone condensation products and of vat dyestuffs. 8,497. March 29. (Germany, March 27, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of nucleal-alkylated, etc., arylsulphonic acids. 8,672. March 30. (Germany, April 1, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of ortho-aminophenylpropionic acid, etc. 8,779. March 31. (Germany, April 6, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of dyestuffs. 8,918. April 1. (Germany, April 9, 1925.)

Jarny, E. J. P. C. de. Manufacture of condensation products from phenols and formaldehyde. 8,659. March 30.

Marsh, R., and Towler, W. T. Stills, etc., for distillation of liquids. 8,500. March 29.

Parkes, D. W., and Robinson, H. W. Removal of tar acids from ammonia liquor, etc. 8,503. March 29.

Parkes, D. W., and Robinson, H. W. Resolution of emulsions or suspensions containing tar or oil. 8,604. March 30.

Patart, G. Synthesising and separating higher alcohols. 8,516. March 29. (France, April 9, 1925.)

Schlamp, H. Treatment of products formed in by-product recovery processes. 8,605. March 30.

Soc. of Chemical Industry in Basle. Manufacture of dye preparations. 8,780. March 31. (Switzerland, April 2, 1925.)

Dyestuffs Licences for March

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during March, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee:—The total number of applications received during the month was 592, of which 515 were from merchants or importers. To these should be added 20 cases outstanding on February 27, making a total for the month of 612. These were dealt with as follows:—Granted, 516 (of which 493 were dealt with within seven days of receipt); referred to British makers of similar products, 60 (of which 53 were dealt with within seven days of receipt); referred to reparation supplies available, 11 (all dealt with within two days of receipt); outstanding on March 31, 1926, 25. Of the total of 612 applications received 557, or 91 per cent., were dealt with within seven days of receipt.

Bayer Agricultural Products

BAYER PRODUCTS, LTD., London, whose offices are at 1, Warple Way, Acton, have issued a circular to British clients, in which they state: "We have now made arrangements with Millwards Merchandise, Ltd. (who have held the sole representation in Great Britain and Ireland for the agricultural and veterinary products put upon the market under the trade marks now owned by this company), whereby as from this date (April 1), such representation shall be terminated and the business will be controlled by us. Millwards Merchandise, Ltd. (P.O. Box 455 Manchester), will, however, hold a stock in Manchester of the Bayer scientific agricultural and veterinary products, and such stock will continue to be available as a source of supply."

Indian Steel Protection Investigation

THE Government of India has requested the Indian Tariff Board to re-examine the existing scheme of steel protection and to report whether protection is still necessary and to what extent, and whether any alteration in the form of protection is recommended. If assistance is better given by bounty, the Board is asked to recommend the sources from which the money is to be obtained.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4¾d. to 5d. per lb. Crude 60's, 1s. 4½d. to 1s. 6d.

ACID CRESYLIC 97/99.—1s. 6½d. to 1s. 9d. per gall. Pale, 95%, 1s. 5d. to 1s. 7d. per gall. Dark, 1s. 3½d. to 1s. 5d. per gall. Steady.

ANTHRACENE.—A quality, 3d. to 4d. per unit.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. 2½d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 9d. to 1s. 11d. per gall., ex works in tank wagons. Pure, 1s. 10d. to 2s. 2d. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 9½d. to 2s. per gall. Pure, 2s. to 2s. 2d. per gall.

XYLOL.—2s. to 2s. 6d. per gall. Pure, 3s. 3d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Standard specification, middle oil, heavy, 6½d. to 7d. per gall.

NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 5d. to 1s. 10d. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 10s. per ton. Whizzed or hot pressed, £5 10s. to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 85s. to 87s. 6d. per ton, according to district. Market active.

PYRIDINE.—90/140, 19s. 6d. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—7d. per lb. naked at works.

ANILINE SALTS.—7d. to 7½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb. Fair home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

o-CRESOL 29/31° C.—3d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B-NAPHTHYLAMINE.—3s. 2d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 6d. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5d. to 5½d. per lb. naked at works. Fair home inquiry.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9. Firmer. Grey, £17 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand good.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb.

ZINC SULPHIDE.—1s. 1d per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£38 10s. to £39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 6d. per lb. Keen competition met. Good demand.

ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.

ACID, BORIC B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 4d. to 1s. 4½d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—6s. 7d. per lb. Resublimed, 7s. 3d.

ACID, SALICYLIC.—1s. 3½d. to 1s. 5d. per lb. Technical.—10½d. to 10⅔d. per lb.

ACID, TANNIC B.P.—2s. 10d. per lb.

ACID, TARTARIC.—1s. 0½d. per lb., less 5%. Market firm.

AMIDOL.—6s. 6d. per lb., d/d.

ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.

AMIDOPYRIN.—12s. 6d. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

ATROPINE SULPHATE.—11s. per oz. for English make.

BARBITONE.—10s. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—12s. 6d. to 14s. 3d. per lb.

BISMUTH CITRATE.—9s. 6d. to 11s. 3d. per lb.

BISMUTH SALICYLATE.—10s. 3d. to 12s. per lb.

BISMUTH SUBNITRATE.—10s. 9d. to 12s. 6d. per lb. according to quantity.

BORAX B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Potassium, 1s. 9d. to 1s. 11d. per lb.; sodium, 1s. 10d. to 2s. 2d. per lb.; ammonium, 2s. 3d. to 2s. 5d. per lb., all spot.

CALCIUM LACTATE.—1s. 3d. to 1s. 5d.

CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

FORMALDEHYDE.—£40 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—7s. 6d. per lb.

HEXAMINE.—2s. 4d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.

HYDROQUINONE.—4s. 3d. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £22 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

MENTHOL.—A.B.R. recrystallised B.P., 21s. 6d. net per lb., Synthetic, 15s. to 19s. 6d. per lb., according to quality. English make.

MERCURIALS.—Red oxide, 5s. 8d. to 5s. 10d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. 3d. to 4s. 5d. per lb.

METHYL SALICYLATE.—1s. 5d. to 1s. 7d. per lb.

METHYL SULPHONAL.—16s. 6d. per lb.

METOL.—9s. per lb. British make.

PARAFORMALDEHYDE.—1s. 11d. for 100% powder.

PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.

PHENACETIN.—4s. to 4s. 3d. per lb.

PHENAZONE.—6s. to 6s. 3d. per lb.

PHENOLPHTHALEIN.—4s. to 4s. 3d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots.

POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb. in cwt. lots. Quiet.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 7½d. per lb., spot, slightly easier.

QUININE SULPHATE.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.

RESORCIN.—3s. 9d. per lb. In fair quantities.

SACCHARIN.—55s. per lb. Better demand.

SALOL.—3s. per lb.

SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.

SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb. carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.

SODIUM SALICYLATE.—Powder, 1s. 9d. to 2s. 1d. per lb. Crystal, 1s. 10d. to 2s. 1d. per lb. Very heavy demand.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.

SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

SULPHONAL.—11s. 6d. per lb. Limited demand.

TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

THYMOL.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

ACETOPHENONE.—9s. per lb.

AUBEPINE (EX ANETHOL).—9s. 6d. per lb.

AMYL ACETATE.—3s. per lb.

AMYL BUTYRATE.—6s. 6d. per lb.

AMYL SALICYLATE.—3s. 3d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 3d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 3d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL BENZOATE.—2s. 9d. per lb.

CINNAMIC ALDEHYDE NATURAL.—17s. 6d. per lb.

COUMARIN.—11s. 9d. per lb.

CITRONELLOL.—15s. per lb.

CITRAL.—9s. per lb.

ETHYL CINNAMATE.—9s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—19s. 3d. per lb.

GERANIOL.—7s. to 16s. per lb.

HELIOTROPINE.—6s. per lb.

ISO EUGENOL.—14s. per lb.

LINALOL EX BOIS DE ROSE.—17s. 3d. per lb.

LINALYL ACETATE.—18s. per lb.

METHYL ANTHRANILATE.—9s. 3d. per lb.

METHYL BENZOATE.—5s. per lb.

MUSK KETONE.—35s. per lb.

MUSK XYLOL.—8s. 6d. per lb.

NEROLIN.—4s. per lb.

PHENYL ETHYL ACETATE.—12s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—28s. 6d. per lb.

SAFROL.—1s. 8d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN.—21s. 6d. to 23s. per lb. Good demand.

Essential Oils

ALMOND OIL.—12s. 6d. per lb.

ANISE OIL.—3s. 6d. per lb.

BERGAMOT OIL.—32s. 6d. per lb.

BOURBON GERANIUM OIL.—11s. 9d. per lb.

CAMPHOR OIL.—60s. per cwt

CINNAMON OIL, LEAF.—5d. per oz.

CASSIA OIL, 80/85%.—10s. per lb.

CITRONELLA OIL.—Java, 85/90%, 3s. 2d. Ceylon, 2s. 2d. per lb.

CLOVE OIL.—7s. per lb.

EUCALYPTUS OIL, 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—French 38/40%, Esters, 22s. 6d. per lb.

LEMON OIL.—9s. per lb.

LEMONGRASS OIL.—4s. 9d. per lb.

ORANGE OIL, SWEET.—13s. per lb.

OTTO OF ROSE OIL.—Bulgarian, 65s. per oz. Anatolian, 35s. per oz.

PALMA ROSA OIL.—12s. 3d. per lb.

PEPPERMINT OIL.—Wayne County, 85s. per lb. Japanese, 13s. per lb.

PETITGRAIN OIL.—9s. per lb.

SANDAL WOOD OIL.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

London Chemical Market

OWING to the holidays there has been little activity in the London Chemical Market and conditions do not justify a report. The usual feature will, however, be resumed next week.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 9, 1926.

WITH the holidays intervening and consequent slackness in business there is nothing of importance to record since our last report. Export inquiry, however, remains fairly satisfactory and we have heard of important orders booked for early shipment. Prices on the whole remain unchanged.

Industrial Chemicals

ACID ACETIC.—98/100% quoted £55 to £67 per ton according to quantity and packing c.i.f. U.K. port; 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton, packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flakes, £37 per ton; powdered, £39 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Unchanged at about 5d. per lb., delivered or f.o.b. U.K. ports, but this price could probably be shaded for large quantities.

ACID CITRIC, B.P. CRYSTALS. — In little demand and quoted price reduced to about 1s. 3d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%. — Spot material quoted about £49 15s. per ton, ex store. Offered from the Continent at about £49 per ton, ex wharf, prompt shipment.

ACID HYDROCHLORIC.—In little demand; price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC 98/100%.—Spot material quoted 3¾d. per lb., ex store. Some quantity available for prompt shipment at about 3½d. per lb., c.i.f. U.K. ports.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 11¼d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—Quoted £5 10s. per ton, c.i.f. U.K. ports, early delivery. Spot material available at about £6 5s. per ton, ex store.

ALUM POTASH, LUMP.—Unchanged at about £7 12s. 6d. per ton, c.i.f. U.K. ports. Spot material quoted £9 per ton, ex store; powdered quality 5% per ton less; powdered quality offered from the Continent at about £7 7s. 6d. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Imported material quoted 1s. per ton, ex wharf. Containers extra and returnable. This price can be shaded for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks, delivered or f.o.b. U.K. ports. Industrial quality about £10 per ton less.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £25 to £26 per ton, ex station. On offer from the Continent at about £22 per ton, c.i.f. U.K. ports. Fine white crystals offered from the Continent at about £18 12s. 6d. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED CORNISH.—Spot material unchanged at about £17 per ton, ex store; offered for prompt delivery from works at about £16 10s. per ton, ex wharf.

BARIUM CHLORIDE, 98/100%.—Quoted £9 per ton, c.i.f. U.K. ports, prompt shipment from the Continent. Spot material scarce, but some available at about £10 15s. per ton, ex store.

BLEACHING POWDER.—English material quoted £9 10s. per ton, ex station. Contracts 20s. per ton less. On offer from the Continent at about £7 10s. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental cheaper, now quoted £4 10s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Quoted £3 17s. 6d. per ton, f.o.b. U.K. ports for export. About £3 10s. per ton, f.o.r. works for home consumption.

COPPER SULPHATE, 99/100%.—Price for British material £23 10s. per ton, f.o.b. U.K. ports. Moderate inquiry for export. Continental on offer at about £22 per ton, ex wharf.

FORMALDEHYDE, 40%.—Quote £37 per ton, c.i.f. U.K. ports. Prompt shipment. Spot material available at about £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material unchanged at about £38 15s. per ton, ex store.

LEAD, WHITE.—Quoted £37 15s. per ton, c.i.f. U.K. ports early shipment. Spot material available at about £39 10s. per ton, ex store.

LEAD ACETATE.—White crystals on offer from the Continent at about £42 10s. per ton, c.i.f. U.K. ports; brown quoted about £38 5s. per ton, c.i.f. U.K. ports; spot material available at about £44 per ton, ex store for white quality.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

POTASH CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material quoted £26 10s. per ton, ex store. Quoted £25 per ton, ex wharf, to come forward. 90/94% quality on offer at £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE 98/100% CRYSTALS.—Considerably cheaper offers from the Continent now quoted about £30 per ton c.i.f. U.K. ports. Powdered on offer at about £27 10s. per ton c.i.f. U.K. ports.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 5s. per ton c.i.f. U.K. port, prompt shipment. Spot material available at about £25 per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS. — Spot material quoted 8d. per lb. ex store. Offered for early delivery at 7½d. per lb. ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Rather higher quotations from the Continent now quoted 7½d. per lb. c.i.f. U.K. ports. Spot material on offer at about 7⅝d. per lb. ex store.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken 60%, £16 12s. 6d. per ton; powdered 98/99% £20 17s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £20 10s. per ton ex store. Spot material offered for prompt shipment from the Continent at about £19 15s. per ton c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; H.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals £5 to £5 5s. per ton ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton ex station. Minimum 4-ton lots. Pea crystals, £14 5s. per ton ex station. Continental commercial quality offered £9 per ton ex store.

SODIUM NITRATE.—Quoted £13 per ton ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Quoted £24 per ton ex store. Offered from the Continent at about £22 5s. per ton c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot material quoted 4½d. per lb. ex store, offered for early delivery at 4d. per lb. ex wharf.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/62% solid, £13 5s. per ton; broken, £14 5s. per ton; flake £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton. All delivered buyers' works U.K. minimum 5-ton lots with slight reduction for contracts. 60/62% solid quality offered from the Continent at about £9 15s. per ton c.i.f. U.K. ports; broken, 15s. per ton more; crystals, 30/32%, £7 per ton c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 5s. per ton; roll, £10 per ton; rock, £10 per ton; ground, £9 15s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material 96/98% quoted £23 15s. per ton f.o.b. U.K. port; 98/100% solid on offer from the Continent at about £21 15s. per ton c.i.f. U.K. ports. Powdered, 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, April 9, 1926.

The demand for chemicals this week has been fairly satisfactory considering that the influence of the holidays has hardly evaporated, but buying is still affected by industrial conditions and transactions continue to be very largely for early delivery. Inquiry for chemicals for export is still being received and some expansion of business, with the Canadian market is expected before very long. As regards prices some slight easiness is noticeable in one or two directions, but, taking the market generally, values seem to be fairly steady.

Heavy Chemicals

Inquiry for sodium sulphide has been slow during the week and quotations are rather weak; commercial crystals are at about £9 12s. 6d. per ton and 60-65 per cent. concentrated solid at £11. Phosphate of soda is attracting some attention from buyers and prices are about unchanged at £12 10s. to £12 15s. per ton. Acetate of soda is on the quiet side and has lost some of the ground that had been gained during the last few weeks, quotations ranging between £20 10s. to £21 per ton. Glauber salts are about unchanged at £3 7s. 6d. per ton, but business in this material is slow. Saltcake meets with rather more inquiry at round £3 per ton. Bleaching powder meets with a moderately active market at £8 10s. per ton. Caustic soda is still being offered at from £15 2s. 6d. per ton for 60 per cent. quality to £17 10s. for 76 per cent., and a fair amount of business continues to be done. Alkali is steady at round £6 15s. per ton and meets with a quiet demand. Chlorate of soda is rather quiet but unchanged at 3¾d. to 3¼d. per lb. Hyposulphite of soda is in moderate request and quotations are maintained at round £14 10s. per ton for photographic material and £9 5s. to £9 10s. for commercial quality. Bicarbonate of soda is still being offered at about £10 10s. per ton but business in this is rather poor. Bichromate of soda is in limited request at the moment but prices still hover round 3¼d. per lb.

Carbonate of potash is only in quiet demand but values are not much changed at £26 5s. to £26 10s. per ton for 96 per cent. strength. Caustic potash meets with a limited inquiry and if anything quotations are slightly easier at £27 to £27 5s. per ton. The demand for yellow prussiate of potash is rather subdued and values still have an easy tendency, although not quotably changed from last week's level of 7d. per lb. Permanganate of potash is not particularly active; commercial is quoted at 5d. to 5¼d. per lb. and B.P. quality at round 7d. Bichromate of potash is quiet but fairly steady at 4¼d. per lb. Chlorate of potash meets with a moderate amount of inquiry and prices are held at about 4d. per lb.

Sulphate of copper is still a relatively slow seller, with quotations in the neighbourhood of £24 per ton. The demand for arsenic has not yet widened but values are nominally unchanged at £14 per ton on rails for white powdered Cornish makes. Acetate of lime is slow and easy at £16 7s. 6d. for grey and £7 15s. to £8 for brown. For acetate of lead inquiry is not brisk although values are maintained at £44 10s. per ton for white and £39 to £40 for brown quality. Nitrate of lead is still offering at £40 to £41 per ton. Commercial Epsom salts are unchanged at £3 12s. 6d. to £3 15s. per ton but the demand has been quiet; magnesium sulphate, pharmaceutical quality, is selling slowly at about £4 10s. per ton.

Acids and Tar Products

Oxalic acid is in limited request at the moment and at round 3½d. per lb. prices are less strong. Citric acid is inactive and easy at 1s. 3d. to 1s. 3¼d. per lb. Tartaric acid is slow but little changed at about 11¼d. per lb. Acetic acid meets with a moderate inquiry at £37 10s. per ton for 80 per cent. commercial quality, glacial being offered at round £67.

Pitch keeps fairly steady although in slower demand at 77s. 6d. to 80s. per ton, f.a.s., Manchester. Creosote oil has been rather quiet but values are about maintained at 6¼d. to 6½d. per gallon. Solvent naphtha is inactive but unchanged on the week at 1s. 6¼d. per gallon. Carbolic acid is still featureless and prices are nominal at 5d. per lb. for crystals and 1s. 4½d. per gallon for crude material.

Latest Oil Prices

London.—Linseed Oil, steady. Spot, £30 15s., ex mill; April, £29 7s. 6d.; May-August, £29 15s.; September-December, £30 2s. 6d. Rape Oil, steady. Crude crushed, spot, £49, nominal; technical, refined, £50. Cotton Oil, steady. Refined common edible, £42; Egyptian crude, £36; deodorised, £44. Turpentine closed steadier. American, spot, 62s. 9d.; May-June, 62s. 6d.; and July-December, 59s. 3d. per cwt.

Liverpool.—Linseed.—The market was quiet. La Plata, May-June, £14 12s. 6d. per ton, sellers. Canaryseed quiet. La Plata, April shipment, 13s. 6d. per cwt., c.i.f., sellers. Palm Kernels quiet and easier. January-March and February-April, £20 2s. 6d., sellers. Business was done in March-May and April-June at £20, and at the close there were sellers at £20 and buyers at £19 17s. 6d. per ton. Wood Oil quiet. Hankow, April shipment, 58s. per cwt., c.i.f. barrels.

Hull.—Linseed Oil.—Naked, spot and April, £30; May-August, £30 2s. 6d.; September-December, £30 7s. 6d. Cotton Oil.—Naked Bombay crude, £35; Egyptian crude, £36; edible refined, £39 10s.; technical, £38 15s. Palm Kernel Oil.—Crushed naked, 5½ per cent., £42 10s. Groundnut Oil.—Crushed/extracted, £43 10s.; deodorised, £47 10s. Soya Oil.—Extracted and crushed, £37; deodorised, £40 10s. Rape Oil.—Crude extracted, £47 10s.; refined, £49 10s. per ton, net cash terms, ex mill. Castor Oil and Cod Oil unchanged.

Nitrogen Products Market

Export.—During the last week the demand for sulphate of ammonia has remained unchanged. Buyers from the Continent and the Far East continue to purchase moderate quantities. In view of the heavy consumption and liquidation of stock, the market remains firm. British producers are selling on the basis of £12 10s. per ton f.o.b. U.K. port in single bags.

Home.—Home demand continues to be brisk. Merchants in all parts of the country report that there is no diminution in buying. The demand has been particularly good in Devon and Cornwall, and producers have been hard put to it to meet the demand in that area. It is expected that the total home consumption will exceed that of last year.

Nitrate of Soda.—The nitrate market continues quiet. Cargoes c.i.f. chief European ports are changing hands on the basis of £11 11s. to £11 14s. per ton.

Swiss Chemical Industry

Review of Present Production

The Swiss chemical industry is the subject of an article by Mr. W. Stauffacher, director of the Chemical Works, formerly Sandoz, Berne, in a special production of the Swiss Industries Fair. Swiss aniline colours, he says, are of world-wide importance. Heavy chemicals are not much developed. Two works are making sulphuric and hydrochloric acid, mainly for home consumption; calcinated soda is produced in one place and in a few more caustic soda is turned out; none of these articles is exported. Calcium carbide used to be the principal product of the electro-chemical industry, but its export importance is declining, whilst as a medium leading to aldehyde, acetic acid, etc., it is growing. Nitric acid by the electric spark, though tried at different times, cannot be made economically, the principal reason being the small quantity used in the country and the impossibility of export. The making of ammonia either after Haber, Claude or Casale is not so far introduced in Switzerland. Switzerland is much less the country of the proprietary article, known as such in England and America, than that of the scientific remedies. Different works are producing on a high scale and are constantly increasing the number of their specialities through scientific investigations. These products are mainly made in Basle, but also in Geneva and Berne; they are exported to a great extent to England and America.

The colour industry dates in Switzerland almost from the very first days of aniline colours. It has been kept up to date, and is producing at present the full range, from the old basic, acid, and azo colours through to the modern fast colours of the anthraquinone series; also alizarine is made and indigo on a very large scale. Scientifically, the Swiss industry is well equipped, though, of course, not on the very big scale other countries can pay to do it. Technically there are many difficulties, such as the non-existence of coal in Switzerland and the necessity of buying intermediates outside, there being no cokeries in the country, but in spite of that the production is increasing.

Economically, says the writer, conditions seem to be exceptionally unfavourable on account of the duties raised all round, England going even so far as to prohibit the importation and introducing a system of import licences to the great disadvantage of her suffering textile industries. It is, however, a fact that the Swiss aniline colours have kept their field, that they are widely known, and that they are universally recognised for good quality and regularity of delivery.

Company News

WEARDALE LEAD CO.—The directors have declared an interim dividend of 5 per cent., less tax, payable on April 3.

THARSIS SULPHUR AND COPPER CO.—The net profits for 1925 were £90,688 which, with the surplus brought forward, makes £121,988, which it is proposed to carry to the new account.

BORAX CONSOLIDATED.—A dividend at the rate of 6 per cent. per annum, less income tax at 4s. in the £, has been declared on the preferred ordinary shares in respect of the half year ended March 31, 1926, payable on May 1.

AGUAS BLANCAS NITRATE CO.—It is announced that the directors propose to capitalise the special reserve account of £270,000 by distributing as bonus to the shareholders 1,080,000 fully-paid shares of 5s. in the proportion of 4 new shares for each share held. They also propose to offer 270,000 new shares of 5s. to shareholders at par, devoting the proceeds to improvements of machinery and plant.

GENERAL MINING AND FINANCE CORPORATION, LTD.—The net profit for the year ended December 31 last was £240,897, making, with £22,847 brought forward from 1924, a total amount available of £263,744. After adding £50,000 to reserve, the directors have declared a final dividend of 10 per cent., which makes, with the interim dividend of 5 per cent., a total for the year of 15 per cent. The sum of £30,088 has been carried forward to 1926.

VENO DRUG CO. (1925), LTD.—For the year ended January 31 last the accounts show that the profit brought in from trading and general income, etc., amounts to £107,263, from which has to be deducted £13,524 for taxation and provision therefor, leaving a balance of £93,739. After providing for preference dividends, transferring £20,000 to special reserve, and writing off preliminary expenses, it is proposed to pay a dividend on the deferred ordinary shares of 3d. per share, free of tax, leaving to be carried forward a balance of £5,571.

LEVER BROS., LTD.—The report for the year ended December 31 last shows a balance of £5,556,868 (including £55,312 brought in) standing to the credit of profit and loss account after charging debenture interest, £474,023, and after making ample provision for depreciation. This balance has been appropriated as follows:—Dividends on 7 per cent. preference shares, £2,140,350; on 8 per cent. "A" preference shares, £1,240,414; on 20 per cent. preferred ordinary shares, £757,462; on 20 per cent. "A" preferred ordinary shares, £600,000; on 20 per cent. "B" preferred ordinary shares, £81,100; on 8 per cent. preferred ordinary shares, £76,198; and amount carried to reserve fund, £661,342. The directors have written off the profit and loss account the advertising carried forward at December 31, 1924, amounting to £456,441.

Against the general reserve the directors have charged items of a non-recurring nature amounting to £1,243,294, as follows:—

(*a*) The balance of capital issue expenses appearing in the balance sheet at December 31, 1924, amounting to £160,000;

(*b*) During the year the directors were able to come to a final settlement with the Revenue regarding income-tax and excess profits duty assessed on the company and its associated companies prior to December 31, 1924. This settlement necessitated an additional provision of £487,546 for income-tax and excess profits duty in respect of the years prior to December 31, 1924.

(*c*) Interest charges amounting to £175,000 in connection with the acquisition during the year of the ordinary share capital of the British Oil and Cake Mills, Ltd.

(*d*) Losses on sales of surplus properties, allowances made to associated companies in respect to depreciation and other exceptional items, amounting in all to £420,748.

Writing and Printing Inks

THE New York Public Library has published a list of works (housed in its reference department) relating to the "Chemistry and Manufacture of Writing and Printing Inks." The list comprises 728 books and pamphlets and 1899 patents, the latter compiled from official documents, specifications or abstracts.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following trade marks can be lodged up to April 30, 1926.

"ZULOSITE."

465,125. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. R. R. Minton and Co., Ltd., 39, Cheapside, Liverpool; paint, colour and varnish manufacturers. December 10, 1925.

"OBSKUROL."

465,802. Chemical substances, used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. Goodlass, Wall and Co., Ltd., 42 and 44, Seel Street, Liverpool, Lancashire; manufacturers. January 4, 1926.

"THERMOPAC."

465,285. For boiler covering compositions, to prevent the radiation of heat. Class 1. Frederick William Fanshawe, Saffro Works, Saffron Lane, Leicester; manufacturer. December 15, 1925.

"CARP."

466,226. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including caustic soda and not including any goods of a like kind to caustic soda. Class 1. The Graesser Monsanto Chemical Works, Ltd., Oil Works Road, Cefn, Ruabon, North Wales; and 39, Billiter Buildings, Billiter Street, London, E.C.3; manufacturers. January 19, 1926.

"NAYLOID."

466,298. For cellulose varnishes. Class 1. Naylor Brothers (London) Ltd., Wrexham Road, Slough, Buckinghamshire; varnish, paint, enamel and distemper manufacturers. January 20, 1926. (To be Associated. Sect. 24.)

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS.—Tenders are invited for the supply of the following by the Ministry of Agriculture (Egyptian Government), Cairo:—25,000 tons of nitrate of soda; 5,000 tons of superphosphate of lime; 4,000 tons of nitrate of lime; 1,000 tons of sulphate of ammonia. Specifications from the Commercial Section of the Ministry of Agriculture, 12, Falaki Street, Cairo, Egypt, and at the different Egyptian Consulates abroad. Tenders by June 8.

REFRIGERATION MACHINES.—A firm in Montreal desires to secure representation of a British firm producing or holding sole export rights for the sale of electric refrigeration machines for installation in ordinary refrigerators, preferably those using non-poisonous gases. (Reference No. 388.)

OILS AND FATS.—An experienced British subject at present resident in London desires to represent British exporters of above, either as travelling representative or resident agent. Speaks several European languages. (Reference No. 435.)

Tariff Changes

HUNGARY.—Full tariff rates are now leviable on tartaric acid and alkaloids.

ITALY.—Seed oils may be imported at reduced rates when destined for industrial uses, other than the preparation of foodstuffs. The following when unadulterated are affected:—Castor, raw linseed, boiled linseed, mastic seed, "*curcas*," croton, "*perilla*," China wood, "*soffiati*," and oil of bitter and sweet almonds. In the case of other oils adulteration is necessary in order to secure admission at the reduced rates of duty.

LATVIA.—An emergency tariff increases many duties by 100 per cent. Details to be available at the Department of Overseas Trade.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

DISINFECTANTS AND GENERAL PRODUCTS, LTD., 10, Hatton Yard, Hatton Garden, manufacturers. (C.C., 10/4/26.) £25 19s. 11d. December 8th.

HIRSHBERG, Dr. L. M., 12, Hatherley Gardens, Queens Road, Bayswater, analytical chemist. (C.C., 10/4/26.) £11 8s. 6d. November 27th.

PREMIER DRUG CO., LTD., Fairy Hill Works, Marwood Street, Hightown, Manchester, manufacturers. (C.C., 10/4/26.) £10 14s. 9d. March 3rd.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

STAFFORD AND STAFFORD, LTD., London, W.C., manufacturers of proprietary remedies. (M., 10/4/26.) Registered March 24th, £1,000 debentures; general charge. *Nil. February 2nd, 1925.

Satisfaction

DIMMOCK (ARTHUR T.), LTD., London, W.C., chemical manufacturers. (M.S., 10/4/26.) Satisfaction registered March 23rd, £500, part of amount registered July 1st, 1924.

Bill of Sale

WATTS, William Henry, 19, Sotheby Road, Highbury, chemical merchant. (B.S., 10/4/26.) Filed March 31st, £100.

London Gazette, &c.

Companies Winding Up Voluntarily

BEDFORD CHEMICAL COMPANY (1922), LTD. (C.W.U.V., 10/4/26.) E. Lucas, Chartered Accountant, 7, St. Paul's Square, Bedford, appointed liquidator, March 24th.

DUCHE (T. M.) AND SONS (BUENOS AIRES), LTD. (C.W.U.V., 10/4/26.) By special resolution, March 12th, confirmed March 29th; E. E. Smith, 23, St. Swithin's Lane, E.C.4., appointed liquidator.

FREESE (H.), LTD. (C.W.U.V., 10/4/26.) H. Button, C.B.E., Chartered Accountant, 61 and 62, Lincoln's Inn Fields, W.C.2, appointed liquidator, March 30th. Meeting of creditors at the offices of the liquidator on Thursday, April 15th, 1926, at 12 noon.

LOMERS, LTD. (C.W.U.V., 10/4/26.) W. F. Stiling, 91, Glengarry Road, East Dulwich, S.E., appointed liquidator, March 17th.

Order Made on Application for Discharge

ARMFIELD, Nathaniel, 124, Usk Road, Battersea, manufacturing chemist. (O.M.A.D., 10/4/26.) Discharge suspended for two years until March 1st, 1928.

New Companies Registered

MAGNESIUM PRODUCTION CO., LTD. Registered March 31, 1926. Chemical manufacturers, metallurgical, manufacturing and consulting chemists, manufacturers and producers of magnesium and its alloys, magnesium and alkali chlorides, metal salts, etc. Nominal capital, £7,500 in 5s. shares. Solicitors: Geo. Reader and Co., 35, Coleman Street, London, E.C.

SURREY VARNISH AND ENAMEL CO., LTD. Registered March 29, 1926. Manufacturers of and dealers in varnishes, enamels, paints, pigments, colours, soaps, etc. Nominal capital, £1,000 in 750 preference shares of £1 each and 2,000 ordinary shares of 2s. each. A subscriber: S. Leslie, Felbridge Court, Felbridge, East Grinstead, Sussex.

Canadian Graphite Progression

GRAPHITE mining in Canada is recovering from the depression from which it has suffered for some years. The industry is now being established on a more healthy and favourable basis, and promises well for the future. The Black Donald Mine at Calabogie, Ontario, and the Standard Mine at Guenette, Quebec, finding a ready market for their products, are producing to the full capacity of their concentrating plants. The Black Donald is marketing the greater part of its product in the United States, the Standard in Germany and in England.

Canadian graphite deposits are of good grade. The disseminated flake deposits contain on an average fifteen per cent. graphite. The Black Donald deposit is unique in being the richest known deposit in America, containing over sixty per cent. graphite, and owing to the superior quality of its product it was enabled to maintain production during the periods of uncertainty. Considerable tonnages of ore are available for increased production. Canadian graphite is suitable for both lubrication and crucible purposes. A high grade flake can readily be produced by modern methods of concentration and refining. The percentage of No. 1 flake from the disseminated ore averages around sixty per cent. of the graphite content, No. 2 flake and fines making up the balance of the recovery, which is over ninety per cent. of the content in the ore. The Canadian industry has suffered in the past by inefficient methods of concentration and refining; by inexperienced promoters, and by importations of cheaply mined flake from Madagascar and Ceylon. The first two factors have been largely eliminated, and graphite can now be produced in Canada at a very reasonable price.

Trade with the Argentine Republic

WE have received a copy of the "Report on the Financial, Commercial and Economic Conditions of the Argentine Republic," September, 1925, issued by the Department of Overseas Trade. The report states that the market for heavy chemicals was much better than in the previous year. Germany and the United Kingdom were the principal countries supplying the market and British manufacturers supplied a much larger share of the trade. In ordinary drugs certain German and French products commanded the largest sales. Of fine drugs a good portion was imported from the United Kingdom, but in patent medicines British manufacturers did not obtain such a share of the trade as might be expected, and might be well advised to look into their agency, advertising and selling methods. There was a large sale of sheep dips, mostly imported from the United Kingdom. The importation of dyestuffs showed an increase, Germany supplying about 70 per cent. and the United States about 16 per cent. Competition in regard to dyestuffs is very keen from German, Swiss, and United States suppliers, and the trade is very efficiently conducted by local technical representatives of the leading German and Swiss manufacturers. Some of the details of imports are as follows (amounts in kilograms: except where otherwise stated the United Kingdom is the chief importer): sheep dips, United Kingdom 8,051,006, United States 436,486; common soap, United Kingdom 1,234,651, France 139,744; perfumed soap, Spain 182,952, United Kingdom 32,956; in prepared medicines the United Kingdom comes fifth; in miscellaneous chemicals the United Kingdom comes fourth; caustic soda, United States 5,321,042, United Kingdom 4,352,432; soda, Solvay, United Kingdom 11,271,768, United States 735,046. It may be added that the greatest share of imports into the Argentine falls to the lot of the United Kingdom, very closely followed by the United States.